

G. RESOURCE MANAGEMENT PHILOSOPHIES, VALUES, GOALS, INDICATORS AND OBJECTIVES

1. Introduction

This section provides a description of Canfor's philosophies, values, goals, indicators and objectives for managing the forest resources within the FMA area. The discussion commences with Canfor's forest management philosophies and continues with values, goals, indicators and objectives. The final section will be a discussion of the pertinent issues and opportunities.

2. Canfor's Forest Management Philosophy

Canfor is committed to managing the resources under the control of the Company in compliance with all national and provincial statutes and regulations. The Company has also developed principles, policies and procedures that incorporate the strategic direction for sustainable forest management as outlined in the various national, provincial and industry initiatives indicated in the sidebar. Canfor's documents define the Company's commitments to sustainable forest management and include *Canfor's Mission Statement* (Appendix 10), *Canfor's Environment Policy* and *Canfor's Forestry Principles* (Appendix 11).

2.1 Canfor's Mission Statement

To be a successful company, it is important to have a clear vision of who the Company is and where it is going. Canfor's *Mission Statement* (Appendix 10) has been developed to provide the Company with that vision.

The purpose of the *Mission Statement* is to:

- Describe the type of company it intends to be;
- State and focus on the values the Company believes in;
- Provide a framework and overall direction that will guide the Company in all of its activities; and
- Emphasize and encourage innovation.

2.2 Canfor's Environment Policy

Canfor's Environment Policy (see sidebar) guides the Company's business

Initiatives for Sustainable Forest Management

National:

- Canadian Council of Forest Ministers (1985)
- National Forest Sector Strategy (1987)
- Canada Forest Accord (1992)
- Canadian Biodiversity Strategy (1995)
- National Forestry Strategy (1998 – 2003)
- Canadian Safety Association (1998)

Provincial:

- Alberta Forest Conservation Strategy (1996)
- Alberta Forest Management Science Council (1996)
- Alberta Forest Legacy (1997)
- Interim Forest Management Planning Manual (1998)

Industry:

- ForestCare (1997)
- Canfor:
 - Canfor Mission Statement (1986)
 - Canfor Environment Policy (1999)
 - Canfor's Forestry Principles (1999)
 - Sustainable Forest Management Plan (2000)
 - Detailed Forest Management Plan (2001)



and confirms its commitment to responsible stewardship of the environment by indicating some of its key commitments. The ISO 14001 standard requires companies to develop and implement an environmental policy. Audits are conducted to verify that the Company operates in compliance with its Environment Policy.

“Good environmental stewardship is an integral part of doing business in the forest industry and has long been one of Canfor’s business strengths. We are committed to being a leader in environmental protection in the forest industry.”
D. L. Emerson, President & CEO



Environment Policy

We are committed to responsible stewardship of the environment throughout our operations.

- Comply with or surpass legal requirements.
- Comply with other environmental requirements to which the Company is committed.
- Set and review environmental objectives and targets to prevent pollution and to achieve continual improvement in our environmental performance.
- Create opportunities for interested parties to have input to our forest planning activities.
- Practice forest management that recognizes ecological processes and diversity and supports integrated use of the forest.
- Promote environmental awareness throughout our operations.
- Conduct regular audits of our environmental management system.
- Communicate our environmental performance to our Board of Directors, shareholders, employees, customers and other interested parties.

D.L. Emerson
President and Chief Executive Officer
July 21, 1999

P.J.G. Bentley
Chairman



2.3 Canfor's Forestry Principles

Canfor's Forestry Principles ("the forestry principles") is the corporate initiative that sets the direction for all Canfor operations (Appendix 11). Canfor's Board of Directors approved the forestry principles in April 2000.

"In the fall of 1998, I asked that a special task force be formed to develop principles that would guide the management of our forests into the next century. The task force was mandated to ignore the hype and rhetoric so prevalent in the media and to develop forestry principles based on ecosystem management. They were asked to use the best science available and balance environmental, social and economic considerations in their recommended approach..." **D.L. Emerson, President & CEO**

The forestry principles establish the direction for future strategic and operational plans. In particular, Canfor Grande Prairie Operations used the forestry principles to help direct the development of its Detailed Forest Management Plan (DFMP) and the Sustainable Forest Management Plan (SFMP). Although they were developed at different times due to the sequence of planning events, they are now one document (refer to Section G 5 for additional information regarding the Sustainable Forest Management Plan (SFMP).

The forestry principles outline a broad approach to the sustainability of the forests in which Canfor operates. The forest management systems, including certification standards, that result from the forestry principles will maintain the long-term health of forest ecosystems, while providing ecological, social and economic opportunities for the benefit of present and future generations.

2.3.1 Linkage with the Alberta Forest Conservation Strategy (1996)

In Alberta, the principal document for making recommendations regarding sustaining Alberta's forests is the *Alberta Forest Conservation Strategy* (Alberta Environmental Protection 1997a). It was prepared by Alberta Sustainable Resource Development in fulfillment of a commitment under the Canada Forest Accord (Natural Resources Canada 1992), which was a commitment to making the *National Forest Strategy of 1992* a reality (Canadian Forest Service 1998).

The *Alberta Forest Conservation Strategy* (Alberta Environmental Protection 1997a) is organized around 5 Strategic Directions and 6 Principles.

Strategic Directions

- Ecological Management;
- Sustainable Forest Economy;
- Protected Areas;
 - Range of Management Intensities; and
- Participation and Partnerships.

Principles:

- Economic Stability;
- Ecological Sustainability;



- Precautionary Principle;
- Adaptive Management;
- Accountability; and
- Decision-making.

Canfor's Forestry Principles was developed based on these strategic directions and principles. The following section contains information and excerpts directly from *Canfor's Forestry Principles* to illustrate the linkage to the *Alberta Forest Conservation Strategy*.

2.3.1.1 Strategic Directions:

- Ecological Management – Canfor's goal is to use forest ecosystem management that encompasses entire forest landscapes and that forecasts the future condition of forests for 100 years or more. The Company will use the best available science to develop an understanding of ecological responses to natural and human-caused disturbances. The Company will incorporate this knowledge into higher level and operational plans by applying ecosystem management principles to achieve desired future forest conditions. This also means that ecosystem management may include a range of management systems at varying intensities, that is, some type of zoning. Depending upon other values and uses, management strategies could range from harvesting with natural reforestation and no follow-up treatments to more enhanced forest management by planting with genetically superior seedlings and with a number of stand tending activities. However, all of these systems or strategies of forest management would ensure the protection of the soil and water at the stand level and the maintenance of biodiversity and ecosystem productivity at the landscape level (*Canfor's Forestry Principles*).
- Sustainable Forest Economy – Canfor's goal is to be a global leader in the profitable production of forest products from sustainably managed forests. The long-term intent is to practice sustainable forest management. However, by saying that, the Company recognizes that identifying and maintaining "ecological integrity" across Canfor's diverse landscapes will require that it understands the ecological processes and manages for them. Specific research and monitoring is needed to achieve this. An understanding of ecological responses will allow the Company to plan and develop stand, landscape and forest-specific approaches while moving towards its goal of using ecosystem management to achieve desired future forest conditions. Ecosystem management will enable the Company to emulate natural disturbances to manage forests for a range of values. The Company needs data and modelling tools to assist in forecasting a range of management options and their ecological consequences. The feedback from these predictive tools will facilitate adjusting its actions through the process of adaptive management (*Canfor's Forestry Principles*).

The Company recognizes that it is a steward of public forest land and therefore accepts that it has a public responsibility. The Company intends to use the resource wisely, without compromising its value for future generations. Canfor has implemented a comprehensive certification strategy that reflects its long-standing commitment to excellence in forest stewardship. Canfor Grande Prairie Operations is ForestCare certified and operates under an Environmental Management System (EMS), which was developed to the ISO 14001 standard. Further, its Sustainable Forest Management Plan (SFMP), which is an integral part of this Detailed Forest



Management Plan (DFMP), is certified to the national CSA standard. Refer to Section F 1 for more information on Canfor's certification initiatives.

Canfor will ensure a continuous supply of affordable timber in order to carry out its business of harvesting, manufacturing and marketing forest products. Canfor will strive to maximize the net value of the fiber extracted for sustained economic benefits for employees, communities and shareholders.

The Company recognizes that its wood fiber supply has special properties and will constantly strive to develop suitable markets and to manufacture products that provide higher economic margins to the use of the fiber. In addition, the Company will work on utilizing the whole log and will reduce the amount of fiber and bark burned as waste from the manufacturing processes.

- Protected Areas – As indicated in Canfor's *Sustainable Forest Management Plan* (2000), Canfor is committed to providing support for rare physical environments. The desired condition or management strategy is to provide a degree of protection by not harvesting fiber in areas that are officially classified as rare physical environments. The Parabolic Sand Dunes and Dunvegan West Wildland (designated under Alberta Special Places) are classified as rare physical environments within the FMA area. Refer to Section F 8.1 for additional information regarding rare physical environments.
- Range of Management Intensities – Canfor operates within extremely large forest regions and landscapes. Its activities and those of other forest users, can have impacts at all scales – from the stand to the landscape through to the forest level – over long periods of time. The Company believes that it must identify and forecast the benefits that the forest is expected to provide both spatially and temporally. Canfor will define objectives over a variety of time intervals (temporal scales) and at spatial scales of stand, landscape and forest.

Natural variability occurs as a dynamic process over a range of time intervals (temporal scales), from short-term to extended-rotation time periods and at spatial scales of stand, landscape and forest. It is the variability within and between these scales which produces ecological diversity and allows for the management of a range of conditions, from early successional to old growth (old seral stage) (*Canfor's Forestry Principles*).

- Participation and Partnerships – Canfor will pursue business partnerships and cooperative working arrangements with Aboriginal people to provide mutual social, cultural and economic benefits and to address mutual interests.

Canfor wants to be a leader in establishing business relations with Aboriginal people. Its approach will be based on sound business practices and decisions while working together to address the issues and needs of both parties. Canfor will be open to the development of partnerships and working arrangements with Aboriginal people that are mutually beneficial and increase value to its shareholders.

Cooperative management of the forest will require a variety of approaches, depending upon the interests and capacity of Aboriginal people and Canfor in each location. It may mean consulting with Aboriginal people to gain information about their traditional knowledge of an area and to seek input into the Company's planned operations. It might result in Aboriginal people providing contracted services to Canfor. At a higher level, cooperative management could result in business



partnerships between Canfor and Aboriginal people to manage the forest under some tenure arrangement.

Canfor believes that the development of cooperative working relationships with Aboriginal people will help provide certainty of timber supply for its manufacturing facilities. This, in turn, will help provide the stable business climate needed to attract investment, which ultimately is needed to sustain its business and the communities where the Company operates. Again, all of these arrangements must be based on good, sound business practices and must be mutually beneficial to both Aboriginal people and Canfor (*Canfor's Forestry Principles* 1999a).

2.3.1.2 Principles:

- Ecological Sustainability – Under the CSA certification, Canfor has committed to undertake initiatives and activities to fulfill the 6 criteria established by the Canadian Council of First Ministers (see side bar).
- Economic Sustainability – Only if Canfor is globally competitive and profitable will it accomplish its goals of environmental leadership and sustainability. This is necessary if the Company is to provide security of employment to its employees, provide support for local communities and provide adequate returns to its shareholders (*Canfor's Forestry Principles*).

CSA Criteria	
1.	Conservation of Biological Diversity
2.	Maintenance and Enhancement of Forest Ecosystem Condition and Productivity
3.	Conservation of Soil and Water Resources
4.	Forest Ecosystem Contributions to Global Ecological Cycles
5.	Multiple Benefits to Society
6.	Accepting Society's Responsibility for Sustainable Development

- Adaptive Management – Canfor will use adaptive management to continually improve forest ecosystem management. This will require the development and implementation of collaborative research and monitoring programs.

The scientific understanding of non-timber values of forest ecosystems is currently limited. However, there is a growing body of scientific information that describes natural variability and the relationships between natural and human-caused disturbances. In order to meet the long-term challenges of ecosystem management, research is necessary to establish a baseline for natural variability and also to measure and compare responses between forest management practices and natural disturbances.

Currently, there is no adequate monitoring program that can assess ecologically-based forest management at a variety of scales. Monitoring, including the measurement of variables and responses, is essential to the adaptive management process. Furthermore, research and monitoring are expensive and require a broad range of scientific expertise.

Canfor has strategically used adaptive management on an informal basis. The Company will formalize its adaptive management strategy and will actively seek collaborative research that is directed toward understanding natural ecological systems (*Canfor's Forestry Principles*).

- Accountability – Canfor will be accountable to the public for managing forests to achieve present and future values. The Company will use credible, internationally



recognized, third party verification of its forestry operations as one way of demonstrating its performance.

Canfor operates primarily on public land and is therefore accountable to the public and public agencies (i.e. Government) for forest stewardship. Some members of the public remain skeptical about the ability of companies and Government to conduct environmental audits free of prejudice or bias. Similar concerns are being expressed by Canfor's customers and in turn by their customers. As the concerns of society about environmental issues heighten, earning and maintaining the trust of the public will become even more important. Similarly, maintaining the confidence of customers will also be important.

Verification of the Company's forestry practices by an independent auditor is an effective way to demonstrate the validity of its practices and to alleviate the above concerns (*Canfor's Forestry Principles*).

- Decision-making – Canfor will engage members of the public, communities and other stakeholders in the delivery of the *Canfor's Forestry Principles* and in development of the Sustainable Forest Management Plan (SFMP) and Detailed Forest Management Plan (DFMP). The process will be open, transparent and accountable.

Canfor operates on publicly owned forest land in British Columbia and Alberta under a number of tenure agreements. These tenure agreements and the legislation and regulations which authorize them, reflect the public ownership of the forest resource and provide considerable opportunity for the public to be involved. Existing land use planning processes also require extensive public input. As well, public input is sought on individual forest management plans at each operation.

The forestry sector is crucially important to the communities where they operate. In addition, the public has a right to make its wishes known regarding the social, environmental and economic benefits it wants to derive from public forests. Canfor believes the process of public involvement is very important and it is committed to finding ways to improve it. This will require an open, transparent and accountable process. Canfor is committed to developing this process and the accepts the challenge that it represents (*Canfor's Forestry Principles*).

3. Other Forest Management Planning Policies, Plans, Guidelines, Requirements and Strategies

There are a number of planning policies, plans, guidelines, requirements and strategies, promulgated by Alberta Sustainable Resource Development, that have an effect on forest management and operational planning within the FMA area. The following sections provide more information. The relevant portions and requirements of these requirements, considerations and initiatives are incorporated into Canfor's strategic and operational planning to the maximum extent possible.

3.1 Integrated Resource Management

Through Integrated Resource Management (IRM), government policies, programs and activities are integrated to gain the best long-term benefits, while minimizing conflicts. This approach is based on co-operation and communication. It includes the identification, assessment and comparison of all resource values. It also recognizes that



any specific use of a resource can affect its use and management for other purposes. Those directly affected by a decision have the opportunity to participate in the decision-making process before action is taken¹⁹.

3.1.1 Integrated Resource Plans

Integrated Resource Plans (IRPs) provide direction for managing Alberta's public land and resources. When they are developed, information on resources and activities is gathered and the views of interested government departments, municipal authorities, interest groups and the general public are considered. They are intended as a guide to resource managers, industry and the public having responsibilities or interests in the area covered by the specific plan. Management objectives and guidelines are developed for each resource sector after careful consideration of all input.

To date one sub-regional integrated resource plan, incorporating the FMA area, has been completed - *Sturgeon Lake-Puskwaskau East Sub-Regional Integrated Resource Plan* (EPC 1998). Canfor manages and conducts its woodlands operations within the FMA area covered by that Plan in accordance with the management guidelines contained therein.

3.2 A Policy for Resource Management of the Eastern Slopes (Revised, 1984)

This policy (Alberta Energy and Natural Resources 1977, revised 1984), prepared by the Eastern Slopes Interdepartmental Planning Committee, affects all operating units within the FMA area with the exception of the southern portions of operational subunits EN-1, EN-5 and EN-4 and a northern portion of LAT-1. It is Canfor's policy to manage those parts of the FMA area in accordance with the *Eastern Slopes Policy*.

The *Eastern Slopes Policy* has established 8 land use zones in which various types of activities are allowed (Table 43). Only 4 of these zones are found in the FMA area (Figure 113). Logging is identified as a compatible use in the multiple use, agriculture and industrial zones under normal guidelines and land use regulations. It is also a permitted use in the critical wildlife zone, special use zone, general recreation zone and facility zone subject to Alberta Sustainable Resource Development, Land and Forest Service (LFS) approval of operating plans. No logging is allowed in prime protection zones; no such zones are evident in the FMA area.

¹⁹<http://www3.gov.ab.ca/srd/land/publiclands/publan15a.html#integrate>

Table 43. Compatible Activities by Land Use ZoneDFMP_Tables ver 1.xls
Table 61

Activity	Zone							
	1 Prime Protection	2 Critical Wildlife	3 Special Use	4 General Recreation	5 Multiple Use	6 Agriculture	7 Industrial	8 Facility
Non-motorized recreation								
Fishing								
Hunting								
Scientific study								
Trapping								
Trails, non-motorized								
Transportation and utility corridors								
Primitive camping								
Intensive recreation								
Off-highway vehicle activity								
Logging								
Domestic grazing								
Petroleum and natural gas exploration and development								
Coal exploration & development								
Mineral exploration & development								
Serviced camping								
Commercial development								
Industrial development								
Residential subdivisions								
Cultivation								

Compatible Use Uses that are considered to be compatible with the intent of land use zone under normal guidelines and land use regulations.

Permitted Use Uses that may be compatible with the intent of a land use zone under certain circumstances and under special conditions and controls where necessary.

Not Permitted Use Uses that are not compatible with the intent or capabilities of a land use zone.

These activities are only representative of the range of activities that occur in the Eastern Slopes. For these and any other activities, the possibility of whether they should or should not take place in a particular area must always be measured against the fundamental management intentions for that zone. Since economic opportunities are not all known in advance, site-specific developments may be considered in any zone.

As integrated resource plans are completed and approved, this table and the regional zoning maps will no longer apply.

Source: Alberta Energy and Natural Resources 1977 (Revised 1984)

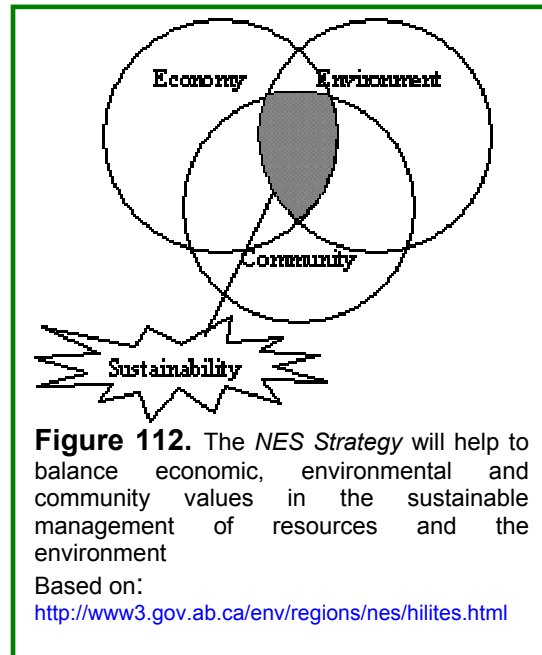
3.3 Northern East Slopes Sustainable Resource and Environmental Management Strategy (NES Strategy)

3.3.1 Background Information

The Alberta Government is committed to the wise management of Alberta's natural resources and protection of the environment for all Albertans. *Alberta's Commitment to Sustainable Resource and Environmental Management Policy* (March 1999) provides the guiding provincial direction. It states that "regional plans will provide a level of detail between provincial policy and operational decision making." Four government departments are responsible for managing and achieving sustainable resource and environmental management: Alberta Sustainable Resource Development (ASRD); Alberta Agriculture, Food and Rural Development (AFRD); Alberta Energy (AE), and Alberta Economic Development (AED).

Each region has an Environmental Resources Committee (ERC) with representatives from each of these departments. The Northern East Slopes ERC is embarking on a unique project, the *Northern East Slopes Sustainable Resource and Environmental Management Strategy* (NES Strategy). It will be developed under the direction of a Regional Steering Group composed of ERC members and appointed community members. The *NES Strategy* will help to balance economic, environmental and community values in the sustainable management of resources and the environment (Figure 112). A regional vision with goals, indicators, and strategies to achieve the goals will be developed.

The *NES Strategy* will concentrate on an area within the Northern East Slopes Region, including portions of Canfor's FMA area.



3.3.2 Purpose of the NES Strategy

The *NES Strategy* is designed to develop a process and implement a common set of goals and values for the region that balance use between diverse interests. This set of goals and values will guide sustainable resource use, community development and regional infrastructure by way of regulatory and policy change, regional planning of industrial and social infrastructure and societal use and management of the land (Regional Steering Group for the NES Strategy 2001).

3.3.3 Desired NES Strategy Outcomes

- Enhanced communication and cooperation among industries, communities, government, and Aboriginal Peoples;
- Clear strategic direction for managing resources in the region;
- Improved management of cumulative effects;
- Better understanding of the relationships between economic, environment, and community interests that are important for decision making within the region;
- Efficient, effective and consistent land management decisions, approvals and referrals;
- Identification of subregional and local planning priorities;
- Increased certainty with respect to the development of the region's natural resources; and
- Ensure community concerns are considered in resource and environmental management decisions (<http://www3.gov.ab.ca/env/regions/nes/hilites.html>).

Canfor is participating in development of the strategy by our involvement in the Regional Carnivore Management Group²⁰.

3.4 1996/97 Operating Guidelines for Industrial Activity in Caribou Ranges in West Central Alberta

The West Central Alberta Caribou Standing Committee (WCACSC) was formed in 1992. The Committee's primary goals were to provide a forum for multi-stakeholder communication and decision-making with regard to land-use guidelines that would help conserve caribou in west central Alberta. Operating guidelines for industrial activity on caribou range (WCACSC 1996) were established in 1996 (Dzus 2001). These *Guidelines* provide 7 key principles, 4 primary management strategies, and general guidelines for operating in caribou ranges. Templates, for development of Caribou Protection Plans, are provided in the appendix within the *Guidelines*.

Canfor has made a commitment to adhere to the *Guidelines* and to submitting information regarding spatial distribution of patches on the landscape to assist the Company and ASRD to evaluate the ecological implications of the DFMP. ASRD and Canfor will work cooperatively to review information, identify issues and determine the appropriate courses of action.

3.5 Forest Management Directives

Periodically, the Alberta Government issues forest management directives (FMD) to further clarify the expectations and requirements for statutes, regulations, standards and initiatives. Canfor conducts its operations in accordance with all relevant FMDs.

²⁰ The Northern East Slopes Environmental Resource Committee (NESERC) has established a Regional Carnivore Management Group (RCMG) to ensure implementation of *Grizzly Bear Conservation in Alberta Yellowhead Ecosystem – a Strategic Framework* over the next 5 years. The RCMG includes representatives from Alberta Environment, Jasper National Park, the forest industry and the oil, gas and mineral industries. The RCMG's primary role is to recommend grizzly bear management directions and actions as outlined in the Framework, and to submit them for approval and adoption by the NESERC and adoption by land and resource managers in the Northern East Slopes Region and Jasper National Park. <http://www3.gov.ab.ca/env/regions/nes/hilites.html>.



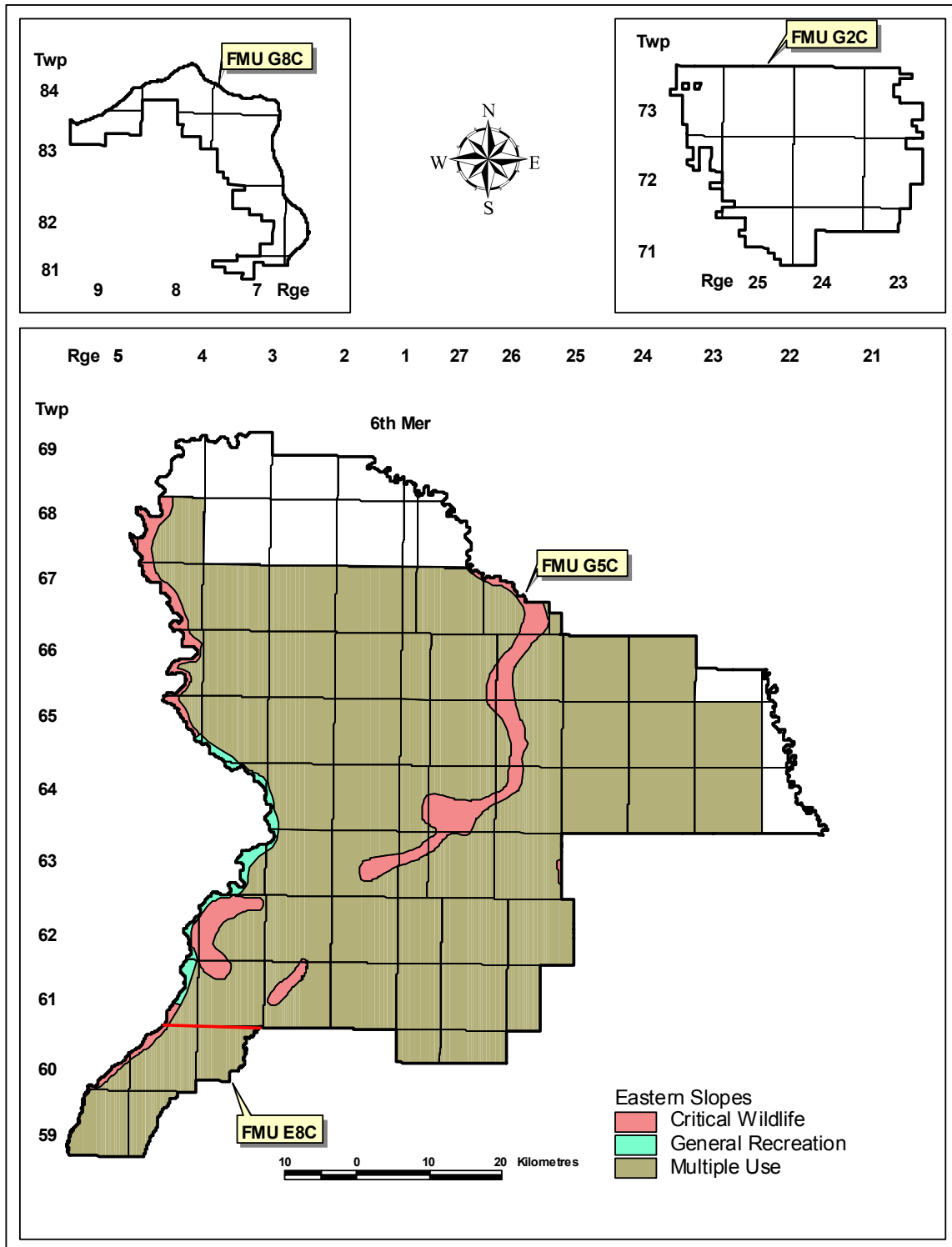


Figure 113. Defined Landuse Zones Within the FMA Area from *A Policy For The Eastern Slopes*

4. Values, Goals, Indicators and Objectives

This section provides a discussion of the values, goals, indicators and objectives for the Detailed Forest Management Plan (DFMP) including those developed for Canfor's Sustainable Forest Management Plan (SFMP). *The Sustainable Forest Management Plan for Canfor, Alberta Region, Grande Prairie Operations* was developed during the first 7 months of 2000 to obtain certification for the Company's forestry operations under the Canadian Standards Association (CSA) Sustainable Forest Management System standard CAN/CSA-Z809-96 (CSAI 1996a). Values, goals, indicators and objectives that are not included in the SFMP are also provided in this section. Refer to Section E 6.3 for information regarding the relationship between the SFMP and the DFMP.

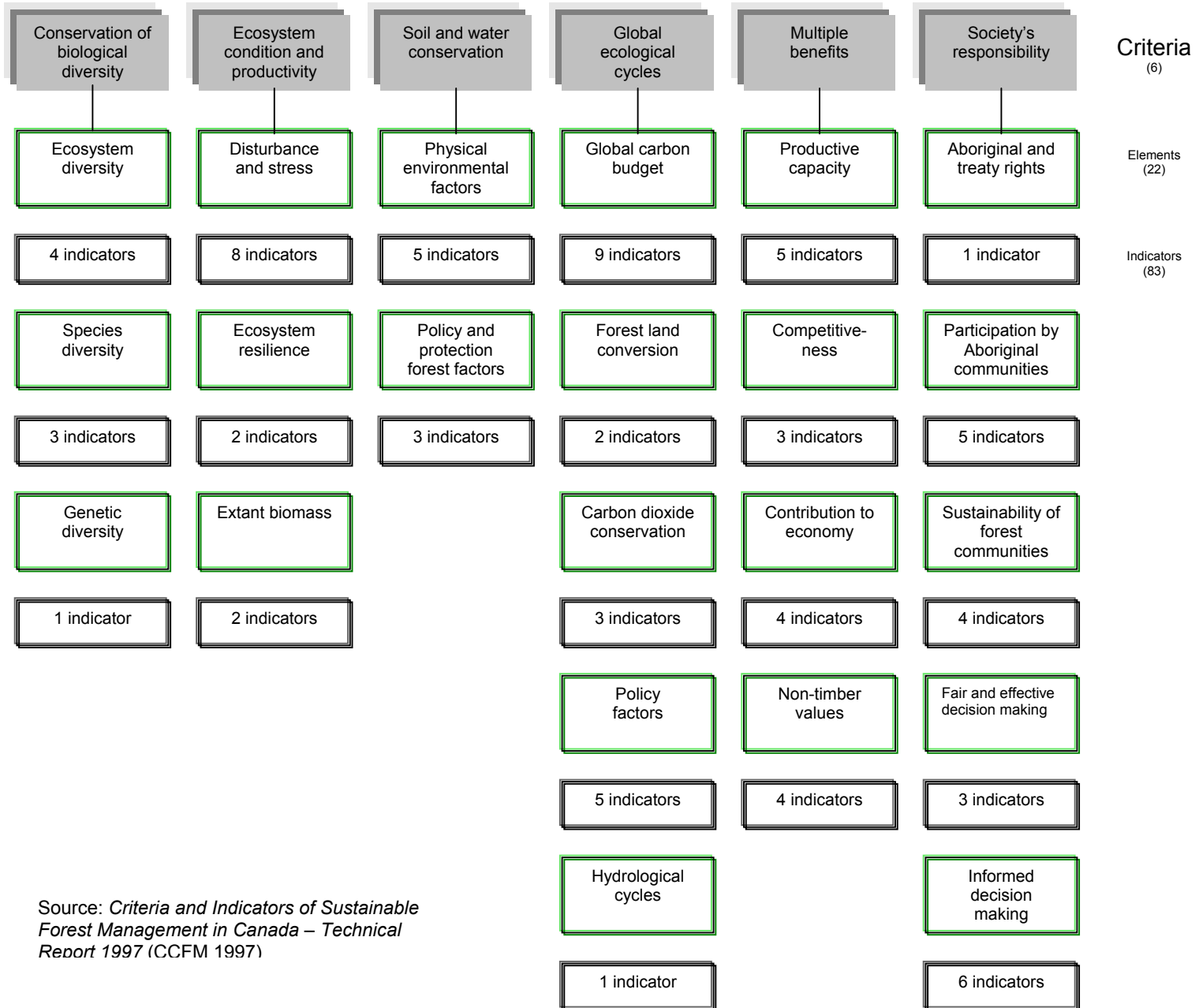
4.1 Canadian Standards Association (CSA) (1998)

The Canadian Government and the Provinces are committed to sustainable forest management and have developed policies and strategies to achieve that objective. National organizations like the CSA have in turn developed standards for certification. Canfor developed its SFMP based on these standards. A chronology of events follows. In 1993, the Canadian Council of Forest Ministers (CCFM) embarked on an initiative to define, measure and report on the forest values Canadians want to sustain and enhance. With the support of technical and scientific advisors, the CCFM consulted extensively with officials and scientists from the federal, provincial and territorial governments, as well as with experts from the academic community, industry, non-governmental organizations, the Aboriginal community and various other interested groups. The results were reflected in *Defining Sustainable Forest Management: A Canadian Approach to Criteria and Indicators*, which was published in 1995. The document outlined 6 sustainable forest management criteria and 22 critical elements (Figure 114) that would serve as a framework for describing and measuring the state of Canada's forests, forest management practices, values and progress toward sustainability (CCFM 1997).

The Canadian Standards Association (CSA) Sustainable Forest Management System standard CAN/CSA-Z809-96 (CSAI 1996a) was developed from these criteria and indicators. In July 1999, Canfor formally announced its commitment to seek sustainable forest management certification of the Company's forestry operations under the CSA standard (refer to Section F 1).



Figure 114. Criteria and Indicators Framework



Source: *Criteria and Indicators of Sustainable Forest Management in Canada – Technical Report 1997* (CCFM 1997)



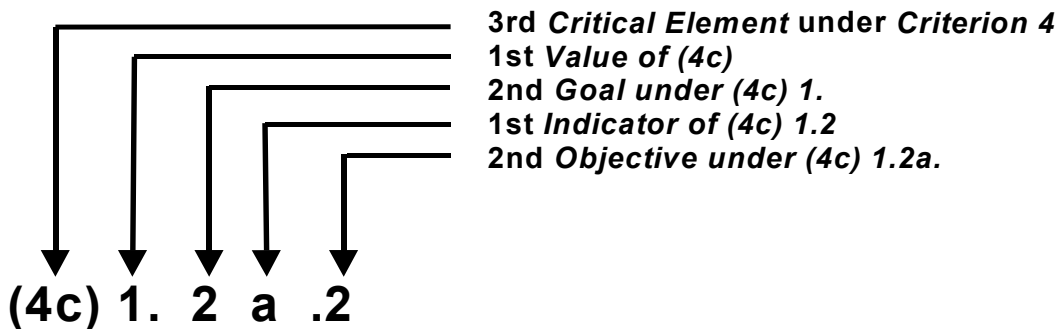
4.2 CSA Performance Framework

The Sustainable Forest Management Plan (SFMP) (Canfor 2000n) was developed with the systematic and formal input from the Forest Management Advisory Committee (FMAC) as required by the Canadian Standards Association (CSA). The primary task of the FMAC was to provide local values, goals, indicators and objectives to Canfor for the 22 critical elements of the 6 Canadian Council of Forest Ministers (CCFM) criteria for sustainable forest management. Canfor has adopted these values, goals, indicators and objectives and has incorporated them directly into this Detailed Forest Management Plan (DFMP).

The relationship between the DFMP and the SFMP is very strong and direct. For additional information regarding the relationship of the DFMP and SFMP, refer to Section E 6.3. Under CSA, a defined forest area (DFA)²¹ must be delineated for the purpose of registration of the Sustainable Forest Management System. Canfor Grande Prairie Operations adopted the FMA area as the DFA (Figure 1).

Section 5 of the Sustainable Forest Management Plan (July 2000) provides the values, goals, indicators and objectives developed by FMAC. It has been provided within this DFMP in its entirety in the following section with additional information added to provide clarity and to make the information current. From this date, the DFMP and SFMP are one document with the name, *Detailed Forest Management Plan (FMA 9900037)*.

The format of the Sustainable Forest Management Plan (SFMP) was designed specifically to address the CSA criterion and this resulted in a numbering system that is unique to the document. This was done in order to assist the reader in being able to directly tie the detailed discussion found here to the CSA Matrix (Appendix 7). The text under each Criterion, Critical Element, Value, Goal, Indicator and Objective has been given a unique alphanumeric identifier as shown in the following schematic:



²¹ Defined Forest Area is “a specified area of forest, land, and water delineated for the purposes of registration of the Sustainable Forest Management System” (CSAI 1996a: p. 2).

In the above example, the text that this code points to is identified as “Critical Element (4c), Objective 1.2a.2.” In total, the Sustainable Forest Management Plan (SFMP) contains 6 Criteria, 22 Critical Elements, 25 Values, 39 Goals, 76 Indicators and 89 Objectives.

The text for the Criteria and Critical Elements was taken directly from the CSA standards and is presented in a yellow box. The FMAC, by consensus, decided upon the content for all values and goals. Canfor and its consultants then worked on the technical wording required for the indicators and objectives, which were subsequently approved by the FMAC.



1. Criterion

Conservation of Biological Diversity

Biological diversity is conserved by maintaining the variability of living organisms and the complexes of which they are part.

(1a) Critical Element

Ecosystem Diversity

Ecosystem diversity is conserved if the variety and landscape-level patterns of communities and ecosystems that naturally occur on the DFA (Defined Forest Area) are maintained through time.

(1a) 1. Value

Landscape level ecosystem diversity

(1a) 1.1 Goal

Provide support to areas of rare physical environments

The desired condition or management strategy is to provide a degree of protection by not harvesting fiber in areas that are officially classified as rare physical environments.

(1a) 1.1a Indicator

The amount of area of lands excluded from harvest, in the DFMP

The areas protected from harvest (Figure 115) are the Parabolic Sand Dunes (contained in the Main Block) and Cactus Hills, Peace Parkland (also known as Fourth Creek) and Peace River Dunvegan (contained in the Peace Block). These areas, also referred to as rare physical environments, have been excluded from the landbase in the net-down process before the calculation of annual allowable cut (AAC) for the DFMP (Table 4).

(1a) 1.1a.1 Objective

One hundred percent (100%) of identified and validated rare physical environments will not be harvested

◆ Acceptable variance

The acceptable level of variance is zero because 100% of the identified and validated rare physical environments will not be harvested.

◆ Current status

The areas that have been identified as rare physical environments were not included in the calculation of AAC and will not be harvested.

On December 20, 2000, the Cactus Hills, Peace Parkland and Peace River Dunvegan areas received official designation as a special place as part of the Dunvegan West Wildland. The Dunvegan West Wildland, which comprises 20,968.0 ha, contains 4,471.1 ha within the FMA area and 16,496.9 ha outside the FMA area. Notable features of the Wildland include hoodoo landscapes, exposed grassy slopes, fossil beds and habitat for geese, moose, elk, deer and birds of prey. Alberta Sustainable Resource Development is in the process of withdrawing the Wildland from the FMA area.

- ◆ **Forecasting assumptions and analytical methods**
These rare physical environments, although not harvested, contribute to other ecological values on the landbase (e.g., seral stages).
- ◆ **Forest management activities**
There are no harvesting activities for these rare physical environments. There are permanent sample plots (PSP) located in some of the rare physical environments. These plots will continue to be measured in the future.
- ◆ **Implementation schedule**
Maintain current status.
- ◆ **Monitoring procedure**
Ensure no harvesting occurs in these rare physical environments. These areas will be evaluated in the future as to their importance to the ecological attributes of the FMA area. "New" rare physical environments will be reviewed and considered in the future. The impact of any changes in the rare physical environments will be evaluated.
- ◆ **Linkages between strategic and operational plans**
Harvest restrictions for the rare physical environments will be identified in the DFMP and incorporated into the operational plans.

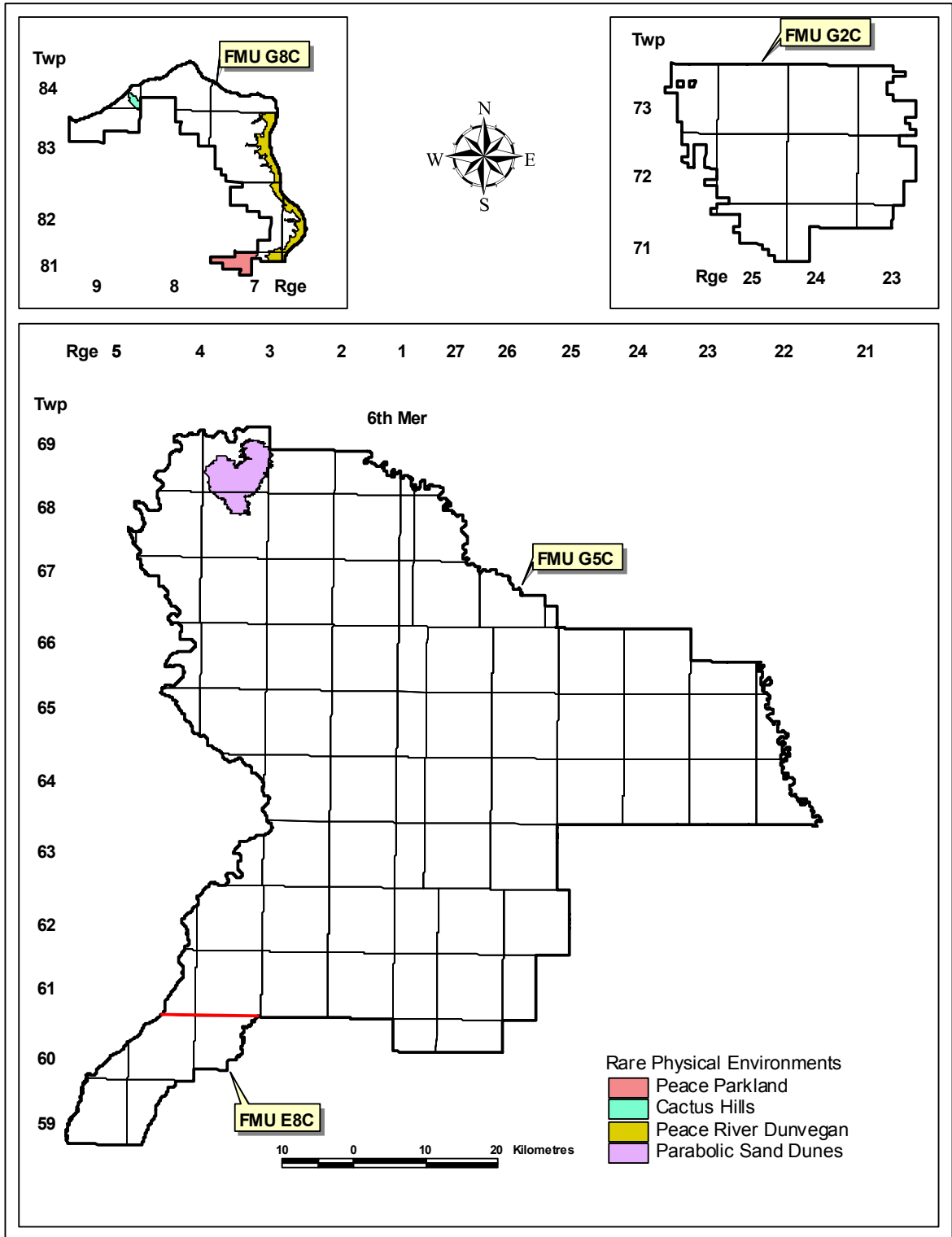


Figure 115. Rare Physical Environments Within the FMA Area

(1a) 1.1b. Indicator

Cactus Hills (84-9-W6M) and Peace Parkland (81-7-W6M)

The Cactus Hills and Peace Parkland (also known as Fourth Creek) will be nominated as special places under the Alberta Special Places Program. The Special Places Program aims to complete a network of protected areas to preserve the environmental diversity of the Province's 6 Natural regions and 20 subregions. The program balances the preservation of Alberta's natural heritage with 3 other cornerstone goals: heritage appreciation, outdoor recreation and tourism/economic development.

(1a) 1.1b.1 Objective

Nominate Cactus Hills and Peace Parkland areas as candidate sites for the Alberta Special Places Program

- ◆ **Acceptable variance**
These areas have already been nominated.
- ◆ **Current status**
Canfor and the Dunvegan West Local Committee nominated the Cactus Hills, Peace Parkland and the Peace River Dunvegan areas for designation under the Alberta Special Places Program. On December 20, 2000, these areas received official designation as a special place as part of the Dunvegan West Wildland. Table 25 shows the area of the Dunvegan West Wildland that occurs within Canfor's FMA area.
- ◆ **Forecasting assumptions and analytical methods**
These designated areas will be maintained as "no harvest" areas.
- ◆ **Forest management activities**
There are no harvesting activities for these designated sites.
- ◆ **Implementation schedule**
Maintain current status.
- ◆ **Monitoring procedure**
This objective has been achieved as of December 20, 2000.
- ◆ **Linkages between strategic and operational plans**
The final boundaries will be incorporated into the future planning process.

(1a) 1.2 Goal

Maintain range of seral stages

Ensure that each seral stage is represented on the landscape at key points in time.

(1a) 1.2a. Indicator**The amount of area in old seral stage at present and key points in time**

For the purposes of this document, the term old growth has been replaced with old seral stage to be consistent with the DFMP seral stage terminology. The characteristics of older forests provide important habitat for a number of species. Old seral stage is defined by the age of the stand at breast height for different yield groups (Canfor 2000). The breast height age ranges used to define seral stages are presented in Table 44.

Table 44. Breast Height Age Ranges for Seral Stages

DMP_Tables.xls

Table 1

Yield Group	Description	Pioneer (1)	Young (2)	Mature (3)	Over Mature (4)	Old (5)	Species	Years to Breast Height (BH)
1	AW +(S) - AB	0	1-20	21-70	71-110	110+	AW	6
2	AW +(S)-CD	0	1-20	21-70	71-110	110+	AW	6
3	AWSW/PBSW/BWSW	0	1-40	41-80	81-120	120+	SW	15
4	BW/BWAW+(S)	0	1-20	21-70	71-110	110+	BW	6
5	FB+OTHERS	0	1-40	41-100	101-120	120+	FB	15
6	H+(S)/S	0	1-40	41-80	81-120	120+	SW	15
7	PB+(S)	0	1-20	21-80	81-110	110+	PB	6
8	PL/PLFB+(H)	0	1-40	41-80	81-120	120+	PL	10
9	PLAW/AWPL	0	1-30	31-70	71-120	120+	PL	10
10	PLSB+OTHERS	0	1-40	41-90	91-120	120+	PL	10
11	PLSW/SWPL + (H)	0	1-40	41-90	91-120	120+	PL	10
12	SBLT/LTSB (G,M,F)	0	1-50	51-130	131-150	150+	SB	20
13	SBLT/LTSB(U)	0	1-50	51-140	141-160	160+	SB	20
14	SBPL/SBSW/SBFB	0	1-40	41-100	101-130	130+	SB	20
15	SW/SWFB + (H)-AB	0	1-40	41-90	91-120	120+	SW	15
16	SW/SWFB +(H)-CD	0	1-40	41-90	91-120	120+	SW	15
17	SWAW/SWAWPL	0	1-40	41-90	91-120	120+	SW	15

Note: Ages are breast height age

Species: PL = Lodgepole pine; SW = White spruce; SB = Black spruce; FB = Balsam fir; LT = Tamarack larch; AW = White aspen (Aspen); BW = White birch; H = Generic for any deciduous species (aspen, birch); S = Generic for any coniferous species (pine, spruce, etc.) OTH = includes other unidentified species when FB or PLSB are identified as the main leading species

Species descriptors: AB = refers to A and B stand densities (A being lower stems per ha than B); CD = refers to C and D stand densities (D being the highest stems per ha therefore the most dense type of stand); G,M,F = Timber productivity rating (site index) - "good, medium, fair"; U = timber productivity rating - uncommercial stand type

Source: Canfor 2000

(1a) 1.2a.1 Objective**Maintain old seral stages within the natural disturbance regimes at present and key points in time**

The target seral stage distribution is one that approximates the expected distribution created by natural disturbance regimes within the 2 Natural regions, Foothills and Boreal Forest (Figure 116). The natural disturbance regime has been modelled by using a theoretical fire-return interval (ORM 2000).

The two most common models used to describe the fire cycle dynamics are the negative exponential distribution (NE) and the Weibull distribution (W). A theoretical distribution can be used to infer the average fire cycle from the age class data. As it turns out, a perfect fit to a negative exponential distribution would result in a fire cycle equal to the average age of all stands. Since it has a

constant burn rate each year, the fire cycle is also the reciprocal of this burn rate. A fire regime following a Weibull distribution has a different burn rate each year so regression must be used to estimate the average fire cycle.

There are several documented works on annual burn rate estimates that are relevant to the Grande Prairie area including Andison 1996, Andison 1997, Andison 2000, Cumming 1997, Murphy 1985 and Van Wagner 1978. . Historical fire cycle and burn rate estimates from these documents are presented in Table 45.

Table 45. Fire Cycle Estimates

DMP_Tables.xls
Table 84

Study	Natural subregion	Fire Cycle (years)
Andison 1996	SBSmk1	80 - 100
Andison 1997	LFH	81
Andison 1997	LFH	92
Andison 2000	LFH	50 - 60
Andison 2000	UFH	60 - 70
Cumming 1997	Central Eastern Alberta	175
Murphy 1985	Central Western Alberta	38 - 90
Van Wagner 1978	Central Western Alberta	50 - 65

Source: ORM 2000

Andison's 1997 study was conducted in the Foothills Model forest in Hinton, Alberta. The study used the roll-back method to estimate the fire cycle from a 1950 perspective and found that the Lower Foothills (LFH) and Upper Foothills (UFH) roll-back cycles were 80 and 101 respectively. LFH and UFH cycles in the Whitecourt area were estimated to be 50-60 and 60-70 (Andison 2000). Cumming (1997) estimated the fire cycle at 175 years but noted that average stand ages were considered to be in the 80-year range.

To develop the fire return intervals, an age class census of the Grande Prairie FMA area was produced by adding all polygon areas in the GIS data and grouping by age and sub-region. This was used to create age class distributions and survivorship curves for each Natural subregion (NSR). Based on Andison 1997, the age class data was then rolled back to 1950 to ascertain if there was any fire suppression effect on the natural fire regime. Canfor's FMA area is spatially discontinuous, which means that stands grouped by NSR will not form contiguous areas. It is assumed that the spatially discontinuous areas have the same fire regime and are subject to the same management history. The results of the analysis are contained in Table 46.

Table 46. Summary of Fire Cycle Analysis

DFMP Tables.xls
Table 85

	LFH	UFH	DMW	CMW
Ave. Age	96	104	72	86
NE Cycle	97	105	70	85
W Cycle	103	106	69	90
W Shape	2.87	4.52	4.75	3.42
NE Cycle Roll Back	61	63	28	45
W Cycle Roll Back	66	66	29	48
W Shape Roll Back	1.94	2.69	1.55	1.71
Note: LFH = Lower Foothills, UFH = Upper Foothills, DMW = Dry Mixedwood, CMW = Central Mixedwood				

Source: ORM 2000

On the basis of the summary presented in Table 46, it was concluded that the range of fire cycles is 60 to 100 years for LFH, 63 to 105 for UFH, 28 to 75 for DMW and 45 to 90 for CMW.

◆ **Acceptable variance**

The acceptable variance is to not fall outside the range of the natural disturbance regimes for the old seral stage in the FMA area and FMUs (G8C, G2C, G5C and E8C) as indicated in Figures 117 to 120, respectively. The acceptable variance represents a combination of both Natural regions where they occur.

Note: Figures 121 and 122 (Foothills and Boreal Forest Natural regions) are provided only as supplementary information.

The solid line in Figures 117 to 122 represents the range of natural disturbance, whereas the bar represents the current and projected distributions.

◆ **Current status**

Currently, the old seral stage is within 0.9 to 2.3% of achieving the acceptable variance in 3 of the 4 area summaries (location) as indicated in Table 47. The observed differences are caused primarily by anthropogenic (human caused) disturbances.

Table 47. Percent of Current Forested Landbase in Old Seral Stage

DMP_Tables.xls
Table 2

Location	Area in Old Seral Stage	Total Forested Area	% of Area in Old Seral Stage	% Natural Disturbance Range
FMA Area	36,088	592,296	6.1	7.0 – 23.4
FMU G8C	391	25,936	1.5	3.8 – 21.4
FMU G2C	5,177	63,667	8.1	3.8 – 21.4
FMU G5C and E8C	30,540	502,693	6.1	7.6 – 23.7

Source: ORM 2001 compiled data



Tables 48 to 53 represent the seral stage area by year for the FMA area, FMUs (G8C, G2C, G5C and E8C) and the Natural regions (Foothills and Boreal Forest).

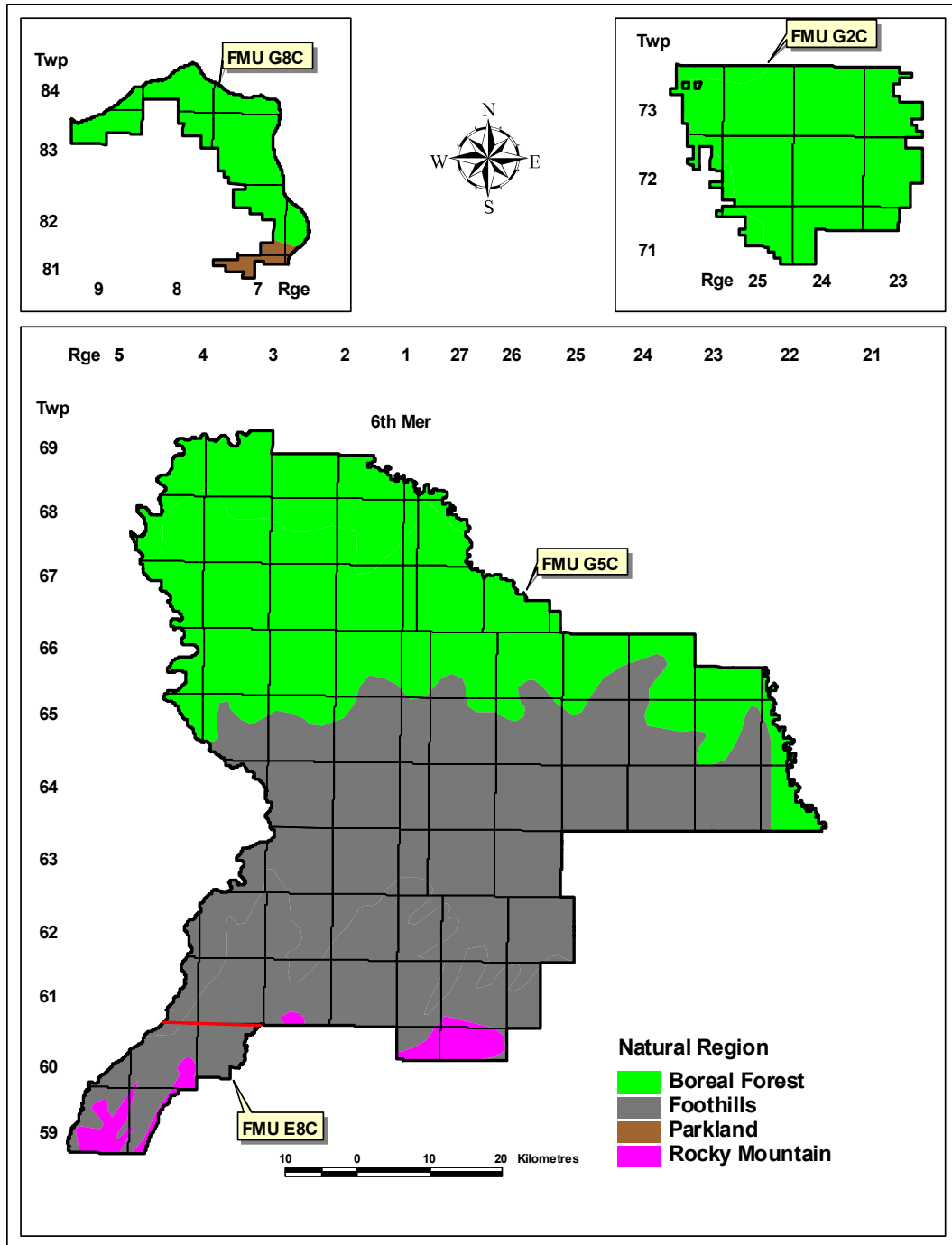
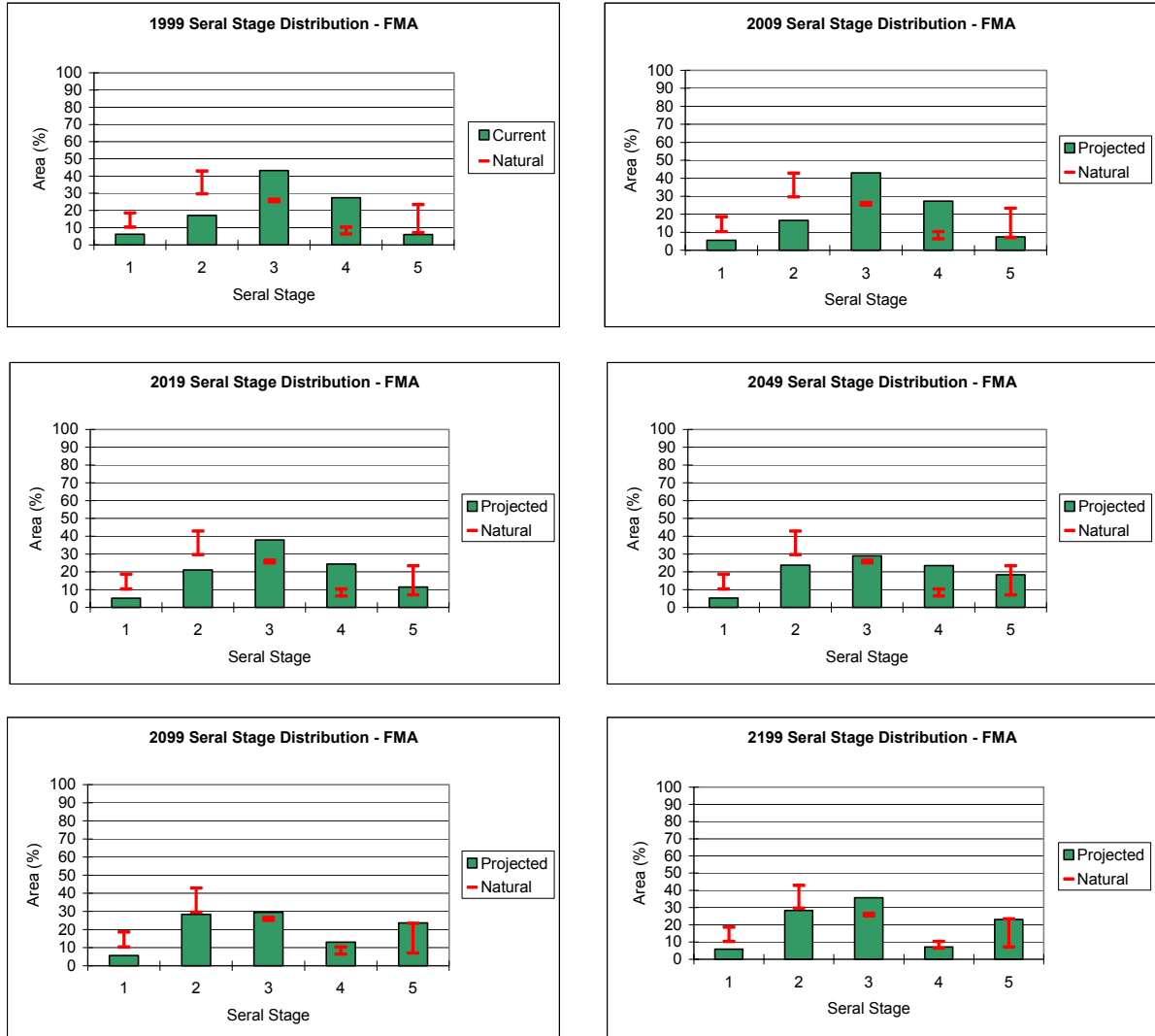


Figure 116. Natural Regions Within the FMA Area

Figure 117. Seral Stage Distribution for the FMA Area

ORM_DFMP_Tables.xls
Figure 1

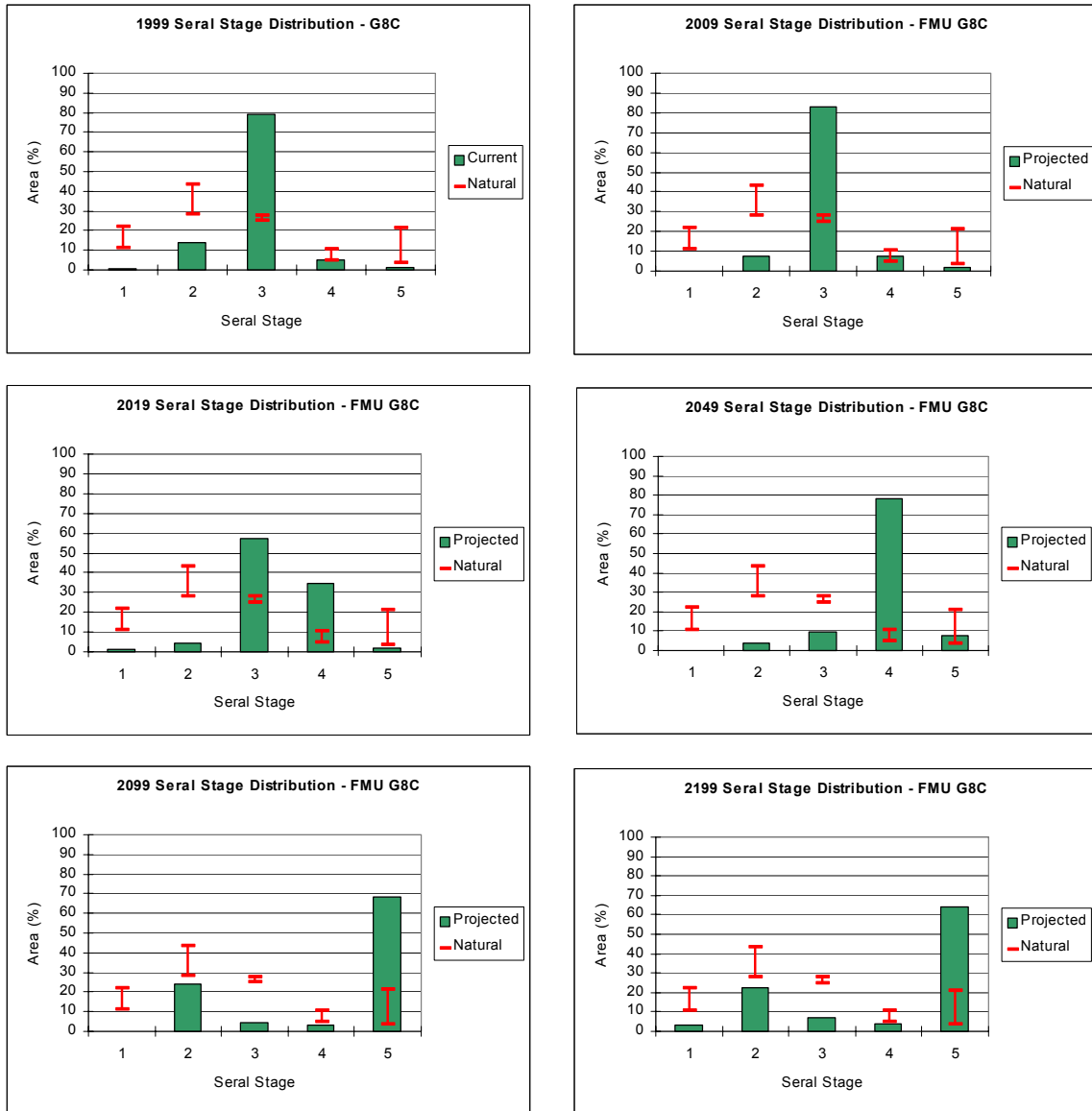


Note: 1 = Pioneer; 2 = Young; 3 = Mature; 4 = Over mature; 5 = Old
Source: ORM compiled data



Figure 118. Seral Stage Distribution for FMU G8C

ORM_DFMP_Tables.xls
Figure 2

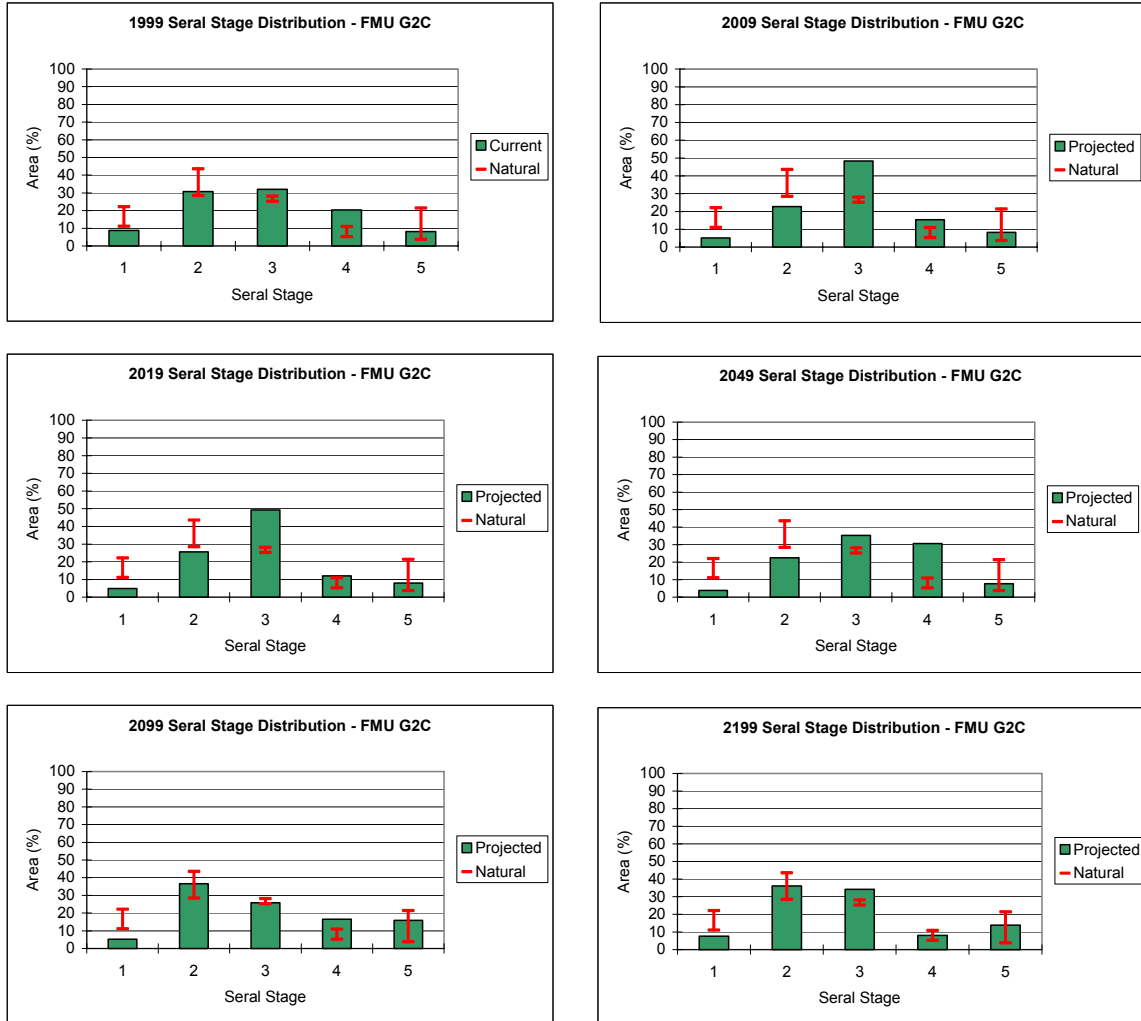


Note: 1 = Pioneer; 2 = Young; 3 = Mature; 4 = Over mature; 5 = Old
Source: ORM 2001 Analysis



Figure 119. Seral Stage Distribution for FMU G2C

ORM_DFMP_Tables.xls
Figure 3

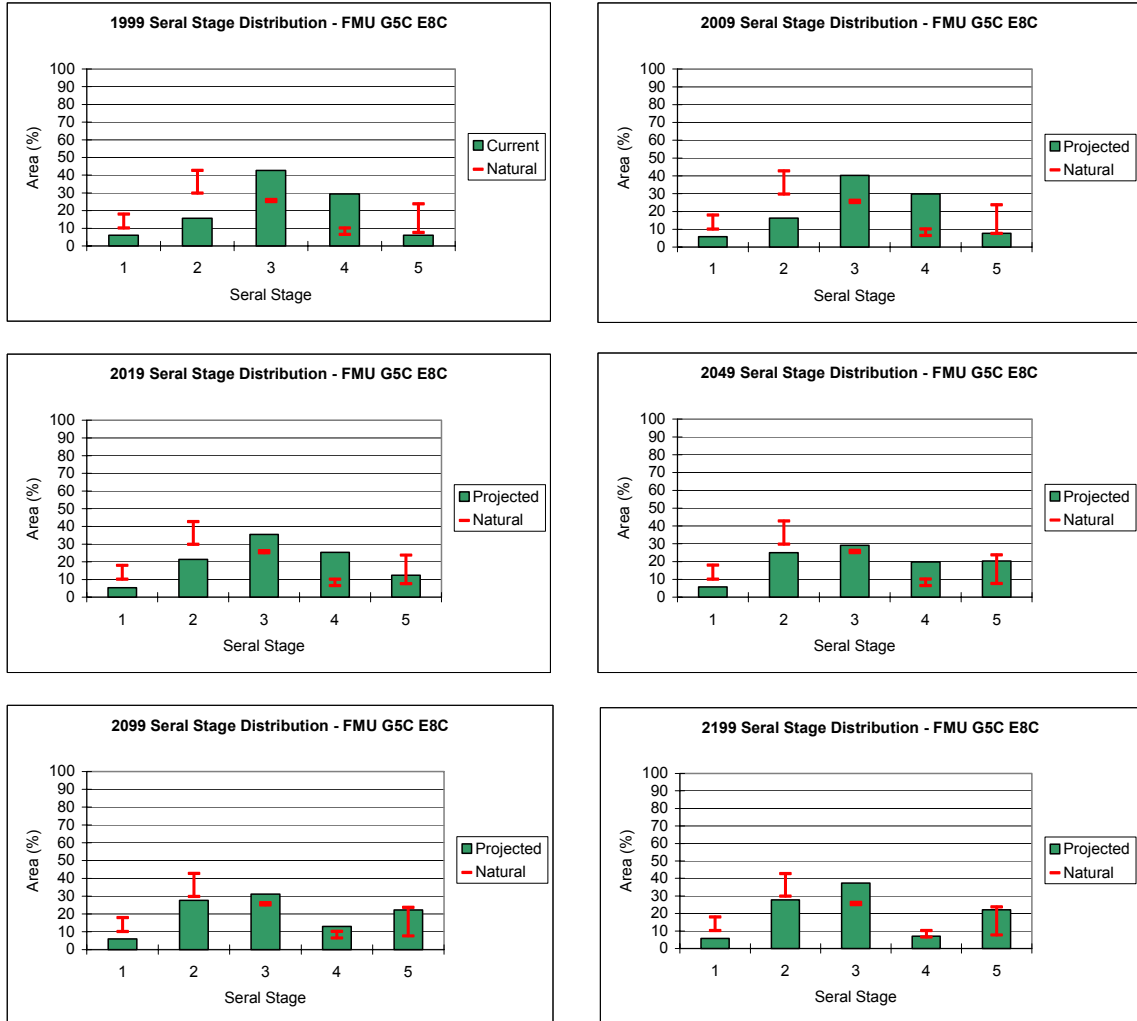


Note: 1 = Pioneer; 2 = Young; 3 = Mature; 4 = Over mature; 5 = Old
Source: ORM 2001 Analysis



Figure 120. Seral Stage Distribution for FMU G5C and E8C

ORM_DFMP_Tables.xls
Figure 4

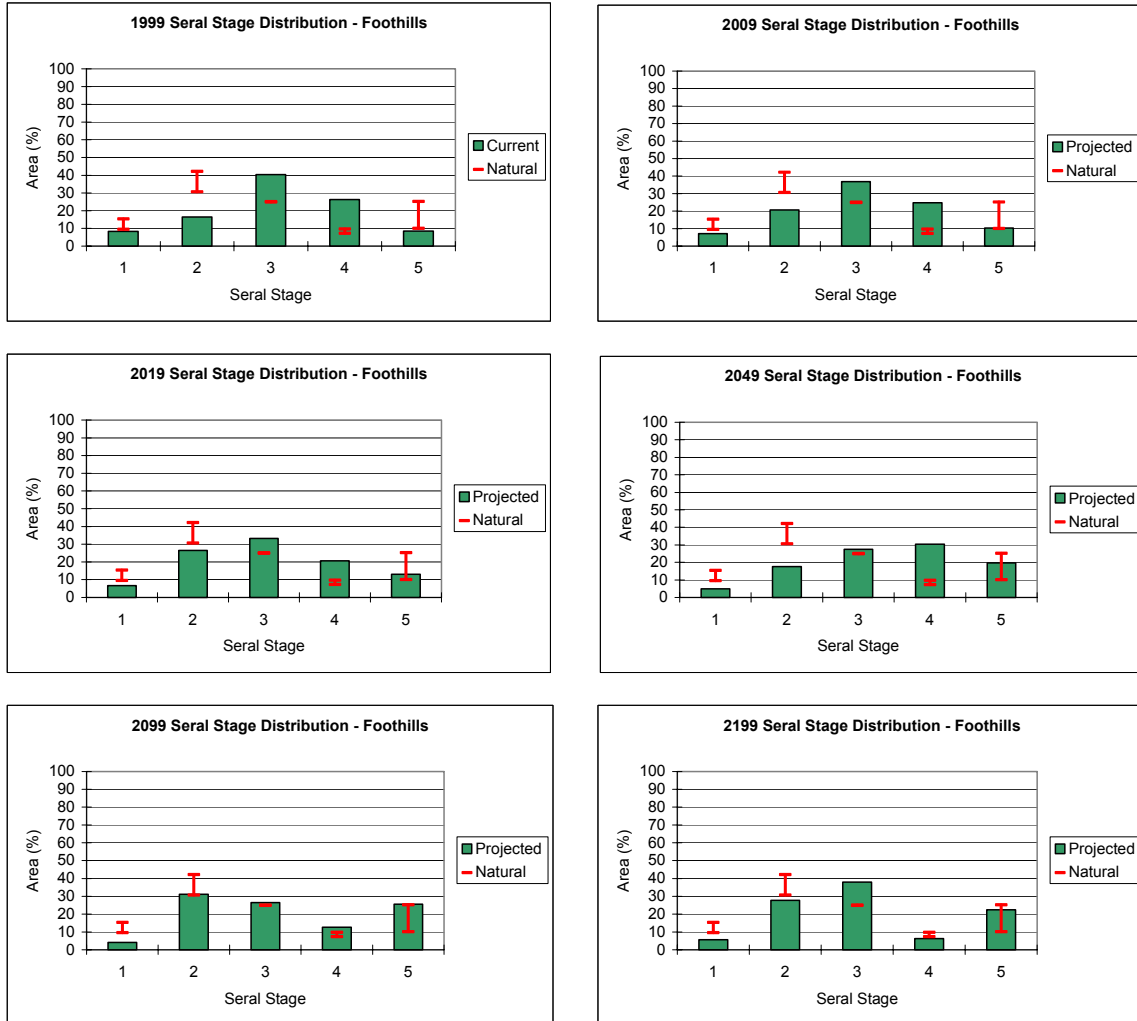


Note: 1 = Pioneer; 2 = Young; 3 = Mature; 4 = Over mature; 5 = Old
Source: ORM 2001 Analysis



Figure 121. Seral Stage Distribution for Foothills Natural Region

ORM_DFMP_Tables.xls
Figure 5

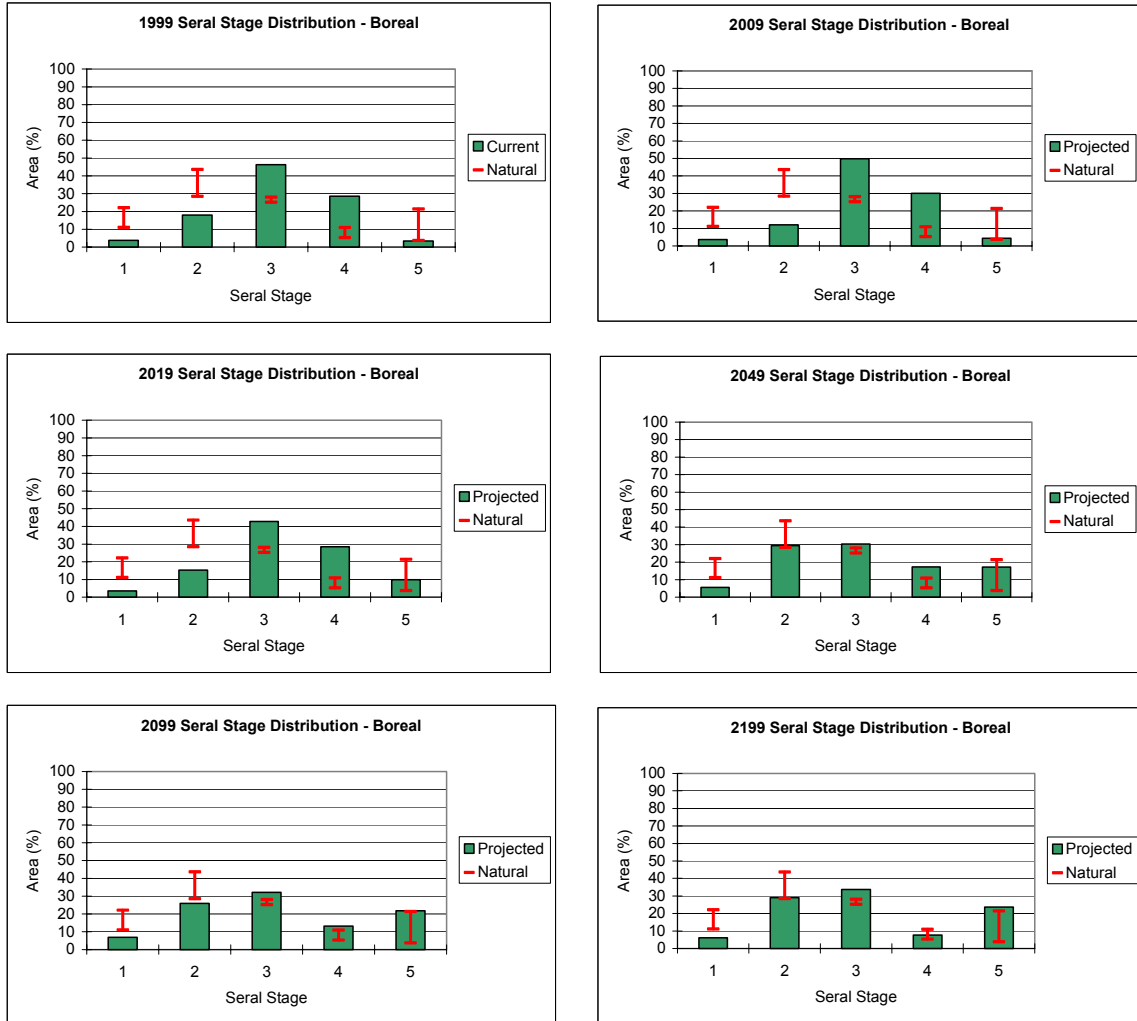


Note: 1 = Pioneer; 2 = Young; 3 = Mature; 4 = Over mature; 5 = Old
Source: ORM 2001 Analysis



Figure 122. Seral Stage Distribution for Boreal Forest Natural Region

ORM_DFMP_Tables.xls
Figure 6



Note: 1 = Pioneer; 2 = Young; 3 = Mature; 4 = Over mature; 5 = Old
Source: ORM 2001 Analysis



Table 48. Seral Stage Distribution for the FMA Total

ORM_DFMP_Tables.xls

Table 3

Year	Area (ha) in each Seral Stage					Grand Total
	Pioneer (1)	Young (2)	Mature (3)	Over mature (4)	Old (5)	
1999	36,494	101,656	255,763	162,296	36,088	592,296
2009	32,716	98,290	254,826	161,829	44,635	592,296
2019	30,621	125,086	224,118	144,354	68,116	592,296
2049	31,200	141,109	171,743	139,379	108,865	592,296
2099	33,130	168,355	174,369	76,715	139,728	592,296
2199	34,517	168,122	211,500	41,648	136,509	592,296

Source: ORM 2001 compiled data

Table 49. Seral Stage Distribution for the FMU G8C

ORM_DFMP_Tables.xls

Table 4

Year	Area (ha) in each Seral Stage					Grand Total
	Pioneer (1)	Young (2)	Mature (3)	Over mature (4)	Old (5)	
1999	243	3,567	20,503	1,232	391	25,936
2009	73	1,937	21,566	1,893	467	25,936
2019	364	1,219	14,770	9,025	559	25,936
2049	29	974	2,566	20,344	2,023	25,936
2099	20	6,234	1,109	882	17,691	25,936
2199	757	5,775	1,875	939	16,590	25,936

Source: ORM 2001 compiled data

Table 50. Seral Stage Distribution for the FMU G2C

ORM_DFMP_Tables.xls

Table 5

Year	Area (ha) in each Seral Stage					Grand Total
	Pioneer (1)	Young (2)	Mature (3)	Over mature (4)	Old (5)	
1999	5,615	19,560	20,405	12,929	5,157	63,667
2009	3,272	14,489	30,797	9,811	5,298	63,667
2019	3,145	16,297	31,409	7,711	5,106	63,667
2049	2,499	14,347	22,457	19,490	4,874	63,667
2099	3,340	23,330	16,456	10,479	10,063	63,667
2199	4,879	23,003	21,790	5,147	8,848	63,667

Source: ORM 2001 compiled data

Table 51. Seral Stage Distribution for the FMUs G5C and E8C

ORM_DFMP_Tables.xls

Table 6

Year	Area (ha) in each Seral Stage					Grand Total
	Pioneer (1)	Young (2)	Mature (3)	Over mature (4)	Old (5)	
1999	30,636	78,529	214,855	148,134	30,540	502,693
2009	29,370	81,864	202,464	150,125	38,870	502,693
2019	27,113	107,570	177,940	127,619	62,451	502,693
2049	28,672	125,789	146,719	99,545	101,968	502,693
2099	29,771	138,791	156,804	65,353	111,974	502,693
2199	28,882	139,344	187,834	35,562	111,071	502,693

Source: ORM 2001 compiled data

Table 52. Seral Stage Distribution for the Foothills Natural Region

ORM_DFMP_Tables.xls

Table 7

Year	Area (ha) in each Seral Stage					Grand Total
	Pioneer (1)	Young (2)	Mature (3)	Over mature (4)	Old (5)	
1999	25,802	50,927	124,775	81,284	26,542	309,329
2009	22,238	64,079	114,088	76,751	32,171	309,329
2019	20,503	81,861	102,879	63,794	40,292	309,329
2049	17,538	91,137	93,990	53,423	53,241	309,329
2099	21,306	80,146	99,540	40,968	67,368	309,329
2199	18,617	89,590	104,227	23,887	73,008	309,329

Source: ORM 2001 compiled data

Table 53. Seral Stage Distribution for the Boreal Forest Natural Region

ORM_DFMP_Tables.xls

Table 8

Year	Area (ha) in each Seral Stage					Grand Total
	Pioneer (1)	Young (2)	Mature (3)	Over mature (4)	Old (5)	
1999	10,692	50,729	130,988	81,012	9,547	282,967
2009	10,477	34,211	140,738	85,077	12,464	282,967
2019	10,118	43,225	121,240	80,560	27,824	282,967
2049	13,661	49,973	77,753	85,956	55,624	282,967
2099	11,824	88,209	74,829	35,746	72,359	282,967
2199	15,900	78,532	107,273	17,761	63,501	282,967

Source: ORM 2001 compiled data

◆ **Forecasting assumptions and analytical methods**

Seral stage distributions under a natural fire regime were modelled by using a theoretical fire-return interval (ORM 2000). The amount of old seral stage in the FMA area and FMUs (G8C, G2C, G5C and E8C) has been forecasted on the landbase at each key point in time (Figures 117 to 120). The key points in time are at years 0, 10, 20, 50, 100 and 200, where 1999 represents year 0. It is assumed that these time periods provide a reasonable picture of the variability of old seral stage over time.

- ◆ **Forest management activities**
The management strategy is to work towards meeting the acceptable variance for those areas not currently achieving the target. This could be accomplished, for example, by deferring harvest of old and over mature seral stages until sufficient areas of old seral stage is available to achieve the acceptable variance.
- ◆ **Implementation schedule**
Preliminary comparisons between current status and the target old seral stage have been completed. All future harvesting plans will follow the strategic direction as outlined in this DFMP and be adjusted as required to meet the desired old seral stage at key points in time.
- ◆ **Monitoring procedure**
The amount of area of old seral stage that is on the landscape will be compared to the expected natural distributions at key points in time.
- ◆ **Linkages between strategic and operational plans**
All new harvesting plans will follow the strategic direction as outlined in this DFMP.

(1a) 1.2b. Indicator

The amount of area in each seral stage at present and key points in time

Seral stage distribution “is important for the conservation of biodiversity because it enables timber harvests to be planned so as to maintain a full range of successional habitats for wildlife and ecosystem types over the long-term” (CCFM 1997: p.2). Seral stages are defined by the age of the stand at breast height for different yield groups (Canfor 2000). The breast height age ranges used to define seral stages are presented in Table 44.

(1a) 1.2b.1 Objective

Maintain seral stages within the natural disturbance regimes at present and key points in time

The target seral stage distribution is one that approximates the expected distribution created by natural disturbance regimes within the 2 Natural regions, Foothills and Boreal Forest (Figure 116). The natural disturbance regime has been modelled by using a theoretical fire-return interval.

- ◆ **Acceptable variance**
For this planning horizon (200 years), the acceptable variance is to be within the range of the natural disturbance regimes for seral stages in the FMA area and FMUs (G8C, G2C, G5C and E8C) as indicated in Figures 117 to 120, respectively. The acceptable variance represents a combination of both Natural regions where they occur.

Figures 121 and 122 (Foothills and Boreal Forest Natural regions) are provided only as supplementary information.

The range of natural disturbance is represented by the solid line in Figures 117 to 122, whereas the bar represents the current or projected distributions.



◆ **Current status**

The area of each seral stage by year in the FMA area, FMUs (G8C, G2C, G5C and E8C) and Natural regions (Foothills and Boreal Forest) is provided in Tables 48 to 53, respectively.

Figures 117 to 120 indicate the present and forecasted distributions for the FMA area and FMUs as compared to expected natural distributions. The observed differences are caused primarily by fire prevention and control and by anthropogenic disturbances.

◆ **Forecasting assumptions and analytical methods**

Seral stage distributions under a natural fire regime were modelled by using a theoretical fire-return interval (ORM 2000). The amount of area in each seral stage in the FMA area and FMUs (G8C, G2C, G5C and E8C) has been forecasted on the landbase at each key point in time (Figures 117 to 120). The key points in time are at years 0, 10, 20, 50, 100 and 200, where 1999 represents year 0. It is assumed these time periods provide a reasonable picture of the variability of seral stage over time.

◆ **Forest management activities**

The amount of each seral stage and its distribution will be compared to the amount of seral stage expected from a theoretical fire-return interval. Adjustments will be made to the harvest schedule as required to ensure the desired seral stage distribution is obtained over time.

Canfor is committed to submitting seral stages linked to yield groups to assist the Company and ASRD to evaluate the ecological implications of the DFMP. Canfor will provide rationale on how age categories were selected for each yield group seral stage. The Company and ASRD will work co-operatively to review information, identify issues and determine the appropriate courses of action. For additional information regarding seral stages refer to Section C 2.4.

◆ **Implementation schedule**

Preliminary comparisons between current status and the target seral stages have been completed. All future harvesting plans will follow the strategic direction as outlined in this DFMP and be adjusted as required to meet the desired seral stages over time.

◆ **Monitoring procedure**

The amount of area of each seral stage that is on the landscape will be compared to the expected natural distributions at key points in time.

◆ **Linkages between strategic and operational plans**

All new harvesting plans will follow the strategic direction as outlined in this DFMP.



(1b) Critical Element

Species Diversity

Species diversity is conserved if all native species found on the DFA prosper through time.

(1b) 1. Value

Landscape level species diversity and abundance

(1b) 1.1 Goal

Minimize impacts on wildlife species population abundance

Impacts of Canfor operations on wildlife species populations can be minimized by controlling access, maintaining wildlife habitat and protecting significant wildlife mineral licks.

(1b) 1.1a. Indicator

Amount of Canfor LOC access into the Caribou Area that is gated

This indicator discusses access control into the Caribou Area. Other access management issues are discussed in “Critical Element 3a, Objective 1.1a.1”, which deals with the amount of new Canfor LOC (License of Occupation) access constructed within the FMA area and “Critical Element 3b, Objective 1.1c.1”, which deals with minimizing the amount of roads in harvested areas. Under Alberta legislation, any roads that are constructed on public lands are automatically open to the public. Gates cannot be erected without the approval of the government and then only for wildlife management purposes.

(1b) 1.1a.1 Objective

100% of Canfor’s LOC roads into the Caribou Area will be gated or other appropriate control measures, as approved by the government, will be implemented

- ◆ **Acceptable variance**

Zero variance, as directed by the Province.

- ◆ **Current status**

Canfor has erected gates on the 3 main LOC roads that access the Caribou Area to restrict access for wildlife management purposes:

- Norton Creek Road (LOC 910567, 62-01-W6M);
- Boulder Road (LOC 920512, 62-01-W6M); and



- Camp 9 Road (LOC 890636, 62-01-W6M).
- ◆ **Forecasting assumptions and analytical methods**
No forecasting or analysis is required.
- ◆ **Forest management activities**
Gates are currently in place into the Caribou Area and will be documented in the Forest Road Maintenance System. Gates on new roads that are planned for the Caribou Area will be discussed with Alberta Sustainable Resource Development. For further information on woodland caribou management, refer to Section F 5.3.3.1.
- ◆ **Implementation schedule**
Gates have been erected on all Canfor access into the Caribou Area.
- ◆ **Monitoring procedure**
If future roads are proposed into the Caribou Area, the need for gates will be discussed with the Alberta Government.
- ◆ **Linkages between strategic and operational plans**
The DFMP and Operating Ground Rules identify access management strategies that will be implemented operationally.

(1b) 1.1b. Indicator

Level of suitable habitat for selected indicator species

Consultation with members from the Forest Management Advisory Committee (FMAC), the Forest Ecosystem Management Task Force and Canfor resulted in the selection of the following 7 selected indicator species: moose (*Alces alces*), American marten (*Martes americana*), pileated woodpecker (*Dryocopus pileatus*), barred owl (*Strix varia*), woodland caribou (*Rangifer tarandus caribou*), bull trout (*Salvelinus confluentus*) and trumpeter swan (*Cygnus buccinator*). Out of this group, the first 4 were selected for HSI modelling and the last 3 are to be managed by means of habitat constraint modelling. (Refer to Section F 5.3 for additional information regarding selected indicator species).

These 7 species were selected because they represent a broad and variable range of habitat characteristics. Thus, if the habitat is maintained and available for these species, it is assumed that the FMA area will contain a wide range of habitat conditions suitable for many other species in the planning area.

(1b) 1.1b.1 Objective

Maintain habitat conditions required by identified selected indicator species utilizing HSI models

The techniques used to evaluate the suitability of habitat for specific species are called habitat suitability index (HSI) models. They are able to predict the value of a habitat to a specific species, based on life variables related to food, availability of cover and the physical size of the potential habitat. An HSI value of 0 indicates the non-habitat and a value of 1 indicates the optimum habitat. HSI can be categorized into a scale of habitat quality as nil, low, medium and high. The results from the HSI models are presented in Figures 127 to 130.



HSI and carrying capacity models are only surrogate measures of both present and estimated suitable habitat and populations over time. The models are only for monitoring the effect of the timber management plan on these species.

The HSI and carrying capacity model results help determine which variables in aggregate compose a specific species' habitat. If the HSI model is predicted to have a large percentage of low or nil area or a carrying capacity is below the acceptable variance, then the variable or variables causing a low prediction should be isolated and analysed. It may be determined that the data collected does not adequately represent the variable used in the habitat prediction model; therefore, the sampling strategy should be re-evaluated. Alternatively, once the variable of concern is determined, operational activities or strategic plans that negatively impact the variable of concern should be adjusted as part of an adaptive management plan to ameliorate the situation.

Carrying capacity, the potential number of animals that would occur in a perfect unit of habitat (HSI = 1.0), can be estimated by multiplying the predicted number of animals by the total available habitat (De La Mare 1998).

Canfor is committed to participating jointly with ASRD regarding HSI models, inputs and carrying capacity to assist in identification of management issues and determination of management strategies.

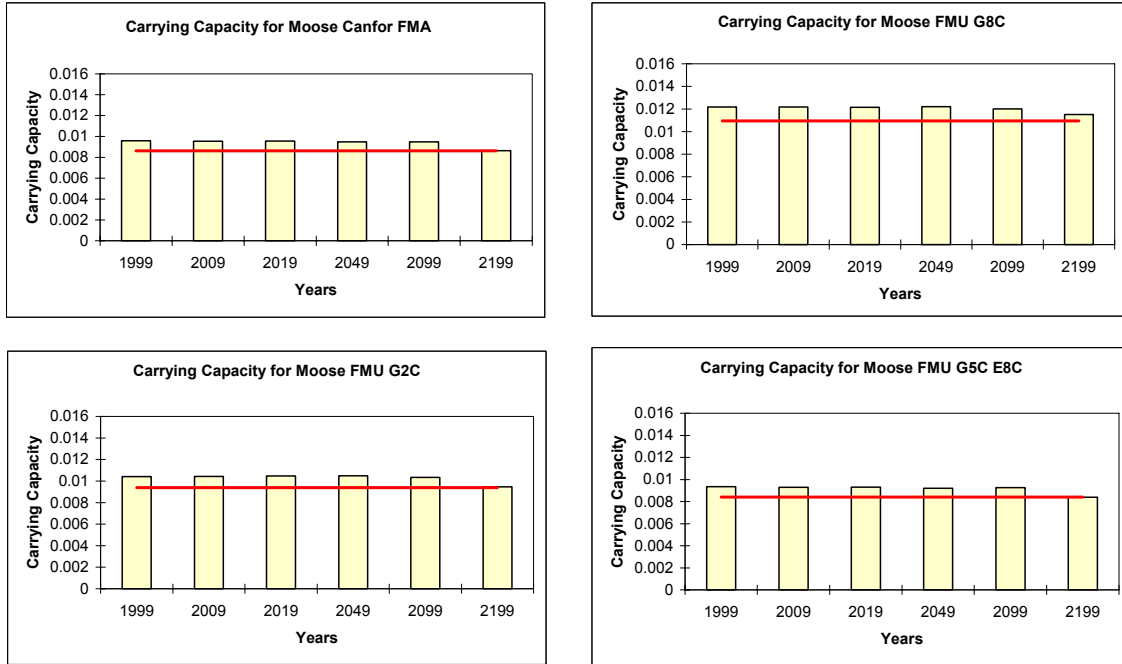
◆ **Acceptable variance**

The acceptable variance for the 4 selected species is to maintain the carrying capacity within -10% of the current status at key points in time (0, 10, 20, 50, 100 and 200 years).

The solid line in Figures 123 to 126 represents the acceptable variance for all 4 selected species. The bars represent the current and projected carrying capacities.

Figure 123. Carrying Capacity Moose

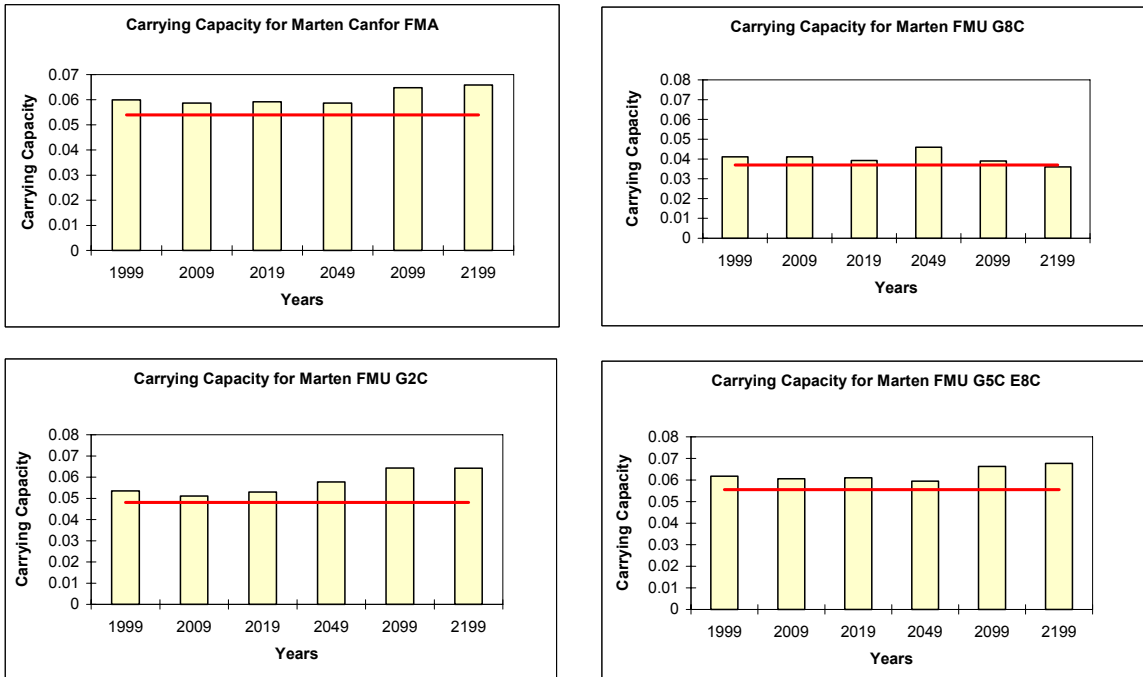
ORM_DFMP_Tables.xls
Figure 7



Source: ORM 2001 Analysis

Figure 124. Carrying Capacity American Marten

ORM_DFMP_Tables.xls
Figure 8

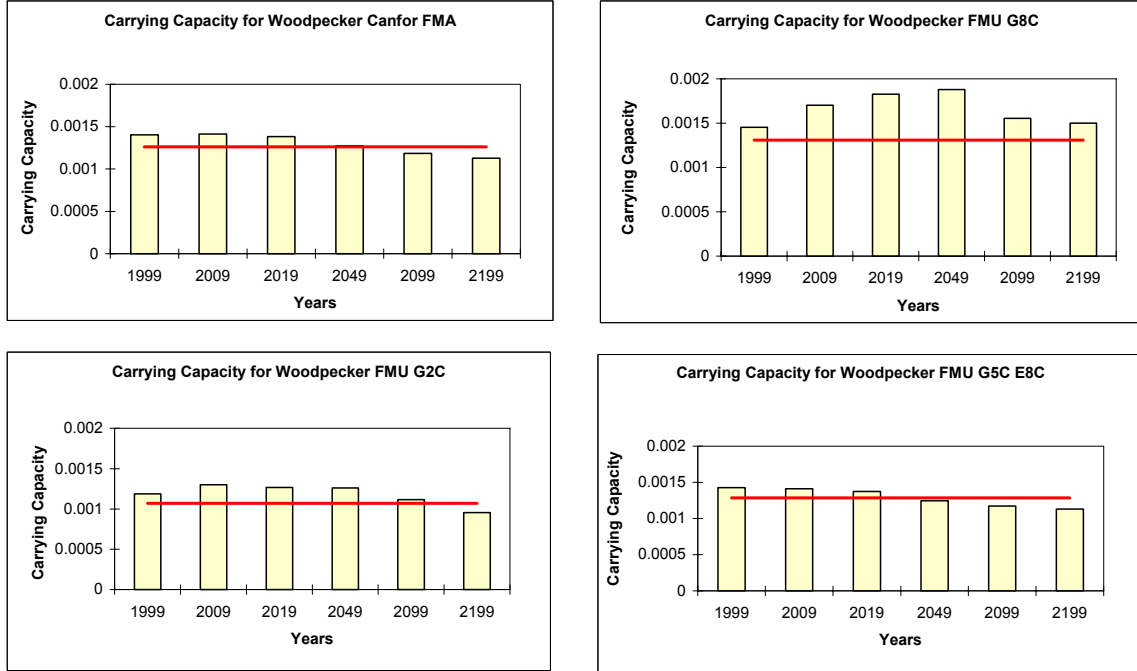


Source: ORM 2001 Analysis



Figure 125. Carrying Capacity Pileated Woodpecker

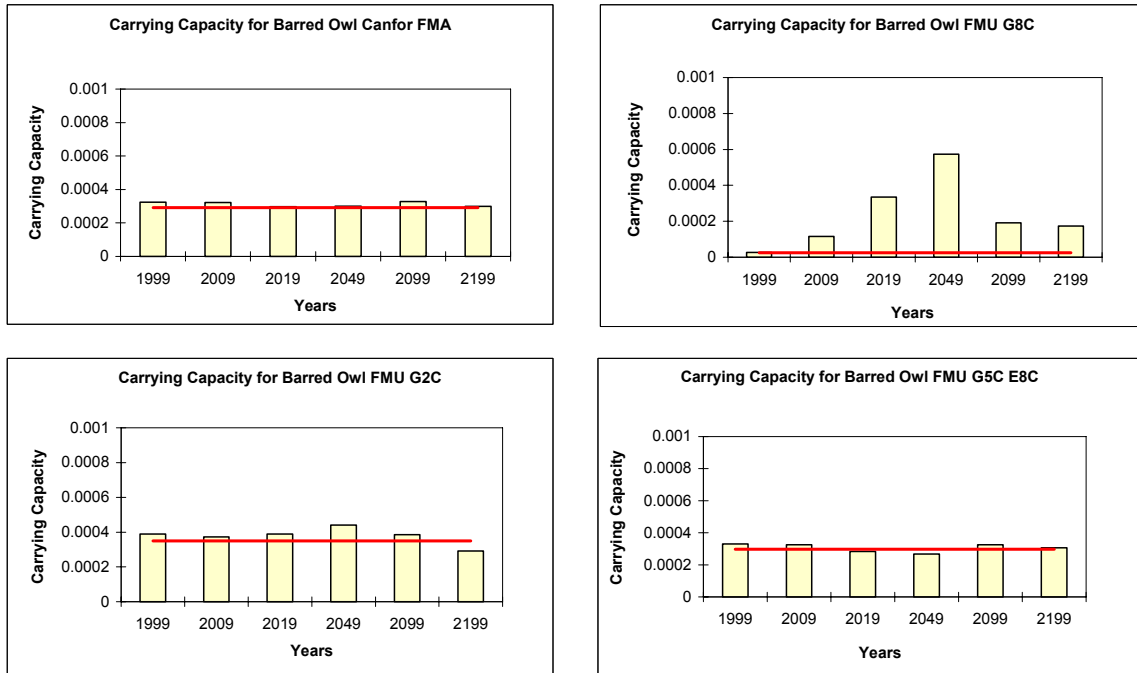
ORM_DFMP_Tables.xls
Figure 9



Source: ORM 2001 Analysis

Figure 126. Carrying Capacity Barred Owl

ORM_DFMP_Tables.xls
Figure 10



Source: ORM 2001 Analysis



◆ **Current status**

The current status for the 4 selected indicator species are as follows:

- Moose: Figure 123 displays the carrying capacity for Moose on an FMA and FMU level. The carrying capacity exceeds the acceptable variance on an FMA level and for all FMUs for the entire planning horizon.
- American marten: Figure 124 shows the carrying capacity for the marten on an FMA and FMU level. The carrying capacity exceeds or meets the acceptable variance for the entire planning horizon on all FMUs and the entire FMA.
- Pileated woodpecker: Figure 125 displays the carrying capacity for pileated woodpecker. For FMU G8C the carrying capacity is above the acceptable variance for all years in the planning horizon. For the FMA area and FMUs G2C and G5C and E8C, carrying capacity drops just below the variance at the end of the planning horizon. This decline is primarily due to the decrease in the amount of area with optimal value (HSI = 1) for the variable representing snags and stubs greater than 16cm DBH per ha. Current data suggest the decline follows the decline in area of mature stands. However, there are gaps in the data estimates of snags and stubs greater than 16 cm DBH across all seral stages for all 17 yield groups.
- Barred owl: Figure 126 shows the carrying capacity for barred owl. On the FMA level and for FMU G8C the carrying capacity meets or exceeds the acceptable variance for the entire planning horizon. For FMU G2C and FMU G5C and E8C the carrying capacity drops just below the variance in specific points in time. According to Olsen et al. (1995) the stand characteristic most important to habitat selection for the barred owl is the presence of suitable nest trees. Research by Takats (1997) has shown that the most suitable nest sites exist in balsam poplar trees of DBH greater than 60 cm. Given the present age and distribution of balsam poplar in the forest, there is limited availability of suitable trees for barred owl.

◆ **Forecasting assumptions and analytical methods**

The assumptions of the HSI models themselves are described in Beck *et al* (1996), De La Mare (1998) and Takats (1997). The key assumptions of the HSI models being used are:

- A larger area of poorer habitat is equivalent to a smaller area of higher quality habitat;
- The quantity and quality of habitat can be used to estimate the maximum potential number of animals that it is able to support; and
- The data available to drive the model is representative of the actual conditions.

◆ **Forest management activities**

In order to apply the HSI models, the relationship between important habitat characteristics and stand variables was evaluated and habitat values determined for each 20-year breast height age class for each yield group

(Canfor 1999c). The habitat models have been applied to the landscape at key points in time (0, 10, 20, 50, 100 and 200 years) to determine the amount of potential habitat available (carrying capacity) for the selected species.

The change in carrying capacity over time for moose, American marten and pileated woodpecker is demonstrated in Figures 123 to 126. The data is shown for the entire FMA area and by FMUs (G8C, G2C, G5C and E8C).

These results must be interpreted as modelled estimates of future conditions and are used for monitoring and changing operational and strategic practices within an adaptive management plan. Decreases in carrying capacity may be caused by physical changes within the FMA area, or they may be a result of measurement and analysis limitations given the complexity of habitat modelling.

Further evaluation of carrying capacities that fall below the acceptable variance will be conducted. If the predicted drop is related to management activities, operational and strategic plans will be adjusted to ameliorate any negative impact. Canfor's Permanent Sample Plot program will help understand the dynamics of snags and stubs and it will also provide data to fill in the gaps currently present in the modelling data set.

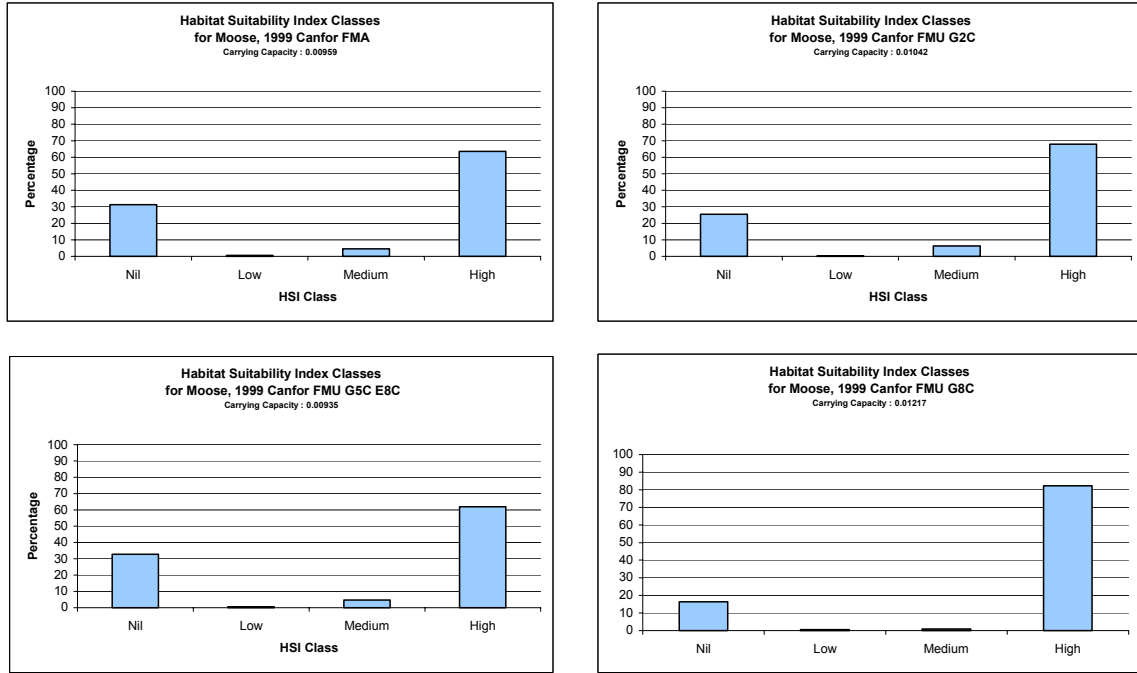
Canfor will work closely with the Alberta Sustainable Resource Development, Land and Forest Division (LFD) and Natural Resources Service (NRS) and the Forest Management Advisory Committee (FMAC) to avoid management practices that place selected indicator species at risk (Canfor 1997).

Canfor is also working on models that utilize an HSI type approach to evaluate wildlife habitat at the landscape level (1:100,000 scale). These models represent a variety of indicator wildlife species grouped into guilds (Canfor 1998b) and will then be applied at key points in time. If potential problems are identified, information from this new landscape level habitat evaluation project will provide insight into the development of preventative and mitigative strategies.



Figure 127. Current HSI % for Moose

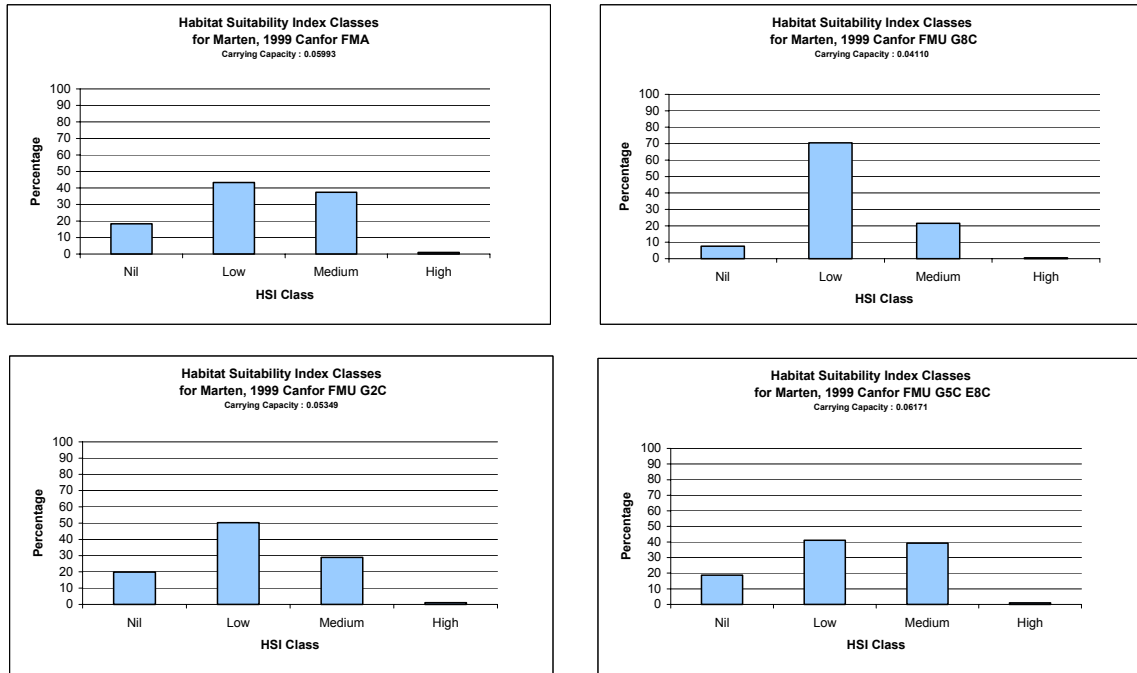
ORM_DFMP_Tables.xls
Figure 11



Source: ORM 2001 Analysis

Figure 128. Current HSI % for American Marten

ORM_DFMP_Tables.xls
Figure 12

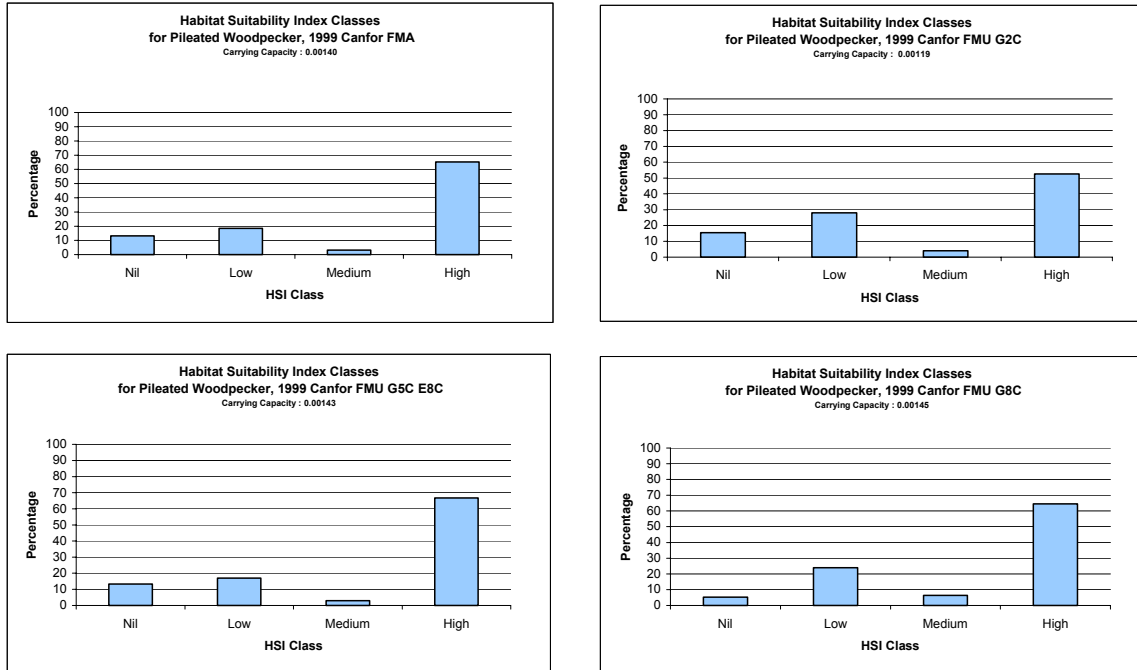


Source: ORM 2001 Analysis



Figure 129. Current HSI % for Pileated Woodpecker

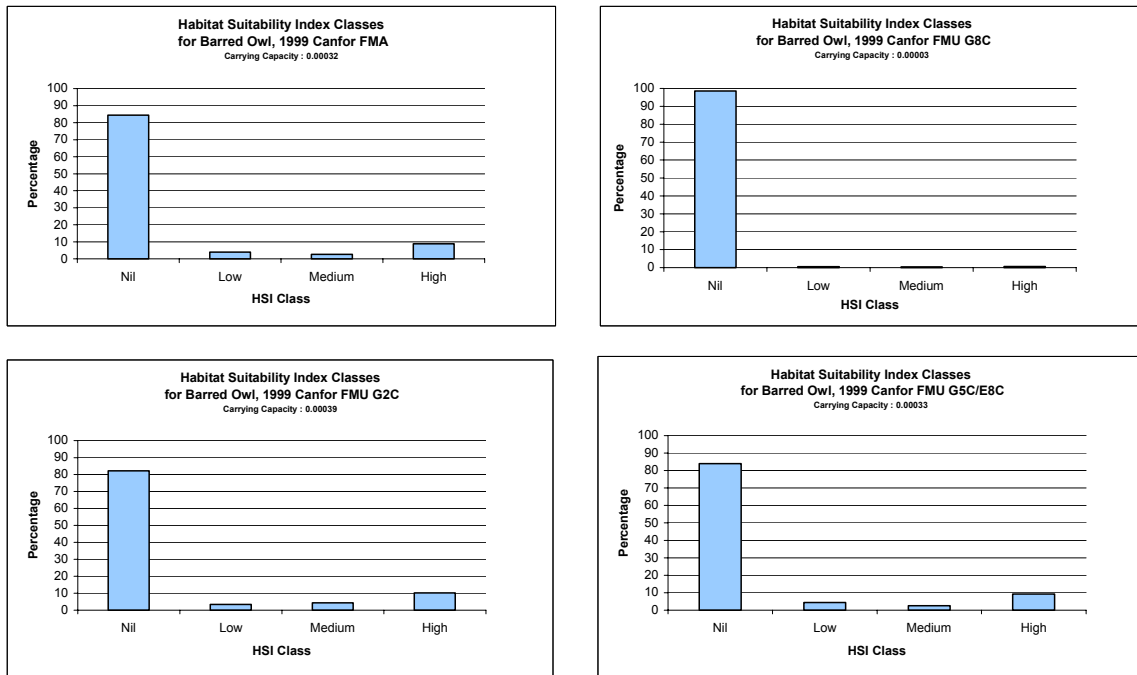
ORM_DFMP_Tables.xls
Figure 13



Source: ORM 2001 Analysis

Figure 130. Current HSI % for Barred Owl

ORM_DFMP_Tables.xls
Figure 14



Source: ORM 2001 Analysis



◆ **Implementation schedule**

The HSI models are reported in this DFMP.

The new landscape level habitat evaluation project has been rescheduled for completion by the end of September 2001; however validation and testing of the model results and development of operational strategies will be completed by May 2003.

◆ **Monitoring procedure**

Harvesting activities will be monitored (as per the forest management activity above) to ensure that they follow the management strategies defined in this DFMP.

◆ **Linkages between strategic and operational plans**

All new harvesting plans will follow the strategic direction as outlined in this DFMP.

(1b) 1.1b.2 Objective

Maintain habitat conditions required by identified selected indicator species, using habitat constraint modelling

◆ **Acceptable variance**

Woodland Caribou

The target for woodland caribou is to have no more than 20% of the area in pioneer or young seral condition. At least 20% of the area must be in old seral condition (Table 54). The acceptable variance for the pioneer/young seral condition is no more than 25% of the area. The acceptable variance for the old seral condition is to be no less than 15% of the area.

Table 54. Percentage of Pioneer/Young and Old Seral Stages in the Woodland Caribou Area

ORM_DFMP_Tables.

Table 1

Year	Pioneer/Young (%)	Old (%)
1999	13	10
2009	18	11
2019	22	15
2049	24	32
2099	24	38
2199	25	42

Source: ORM 2001 compiled data

Bull Trout

Bull trout habitat is dependent on water yield (quantity and timing of run-off) and water quality, which are, in part, dependent on the amount of vegetated cover within a watershed. If too much cover is removed at one time, the resultant water yield increases may affect aquatic habitat. Aquatic habitat can be maintained by maintaining water quality.

Within a defined watershed, total vegetated cover removal will not exceed 35% ECA above the H60. Total vegetated area includes the forested and non-forested vegetated covers (refer to “Critical Element 3c, Objective 2.1a.1” for further information regarding the H60 and ECA). Also refer to Section F 4.1.1.

Trumpeter Swan

In the Grande Prairie area, provincial biologists make recommendations to Public Lands or Lands and Forest Division (LFD) to apply land use conditions to new dispositions near swan lakes. Specifically, some of the land use conditions may include:

- Permit holders should not work within 800 m of Trumpeter swan lakes, and may not fly over these lakes during the breeding season (April 1–September 30);
- No long term development (such as roads, wells or pipelines) within 500 m of Trumpeter swan lakes, including drilling of geophysical shot holes;
- No new grazing dispositions issued around swan lakes; and
- No timber harvesting within 200 m of swan lakes (James 2000).

These conditions are not legislated at this time; however they maybe a component of the operational ground rule development process currently in progress.

The acceptable variance is zero with respect to harvesting within the “no harvest” buffers unless approved by Alberta Sustainable Resource Development.

◆ **Current status**

Woodland Caribou

There are 2 woodland caribou herds within and adjacent to the FMA area: A La Peche and the Little Smoky (Figure 131). Their total range is 466,127 ha. The total amount of woodland caribou area within the FMA area is 70,228 ha as depicted in Figure 130 (representing 15% of the total area and 10.8% of the total FMA area of 649,160 ha).

Table 54 represents the current status (1999) and projected status for pioneer/young and old seral stage distribution.

Bull Trout

The total bull trout area identified within the FMA area is 242,828 ha as indicated in Figure 132. This represents 37% of the total FMA area.

The H60 line has been determined for all watersheds aggregated up to a minimum of 500 ha in the bull trout area (Figure 133). There are a total of 163 watersheds in the bull trout area. More detailed description of the data is provided in Appendix 12 Tables 1-4. A summary of watersheds above the ECA of 35% flagged for concern is presented in Table 55. For further information regarding the flagging (concern areas), refer to the Section on *Forecasting assumptions and analytical methods* below.

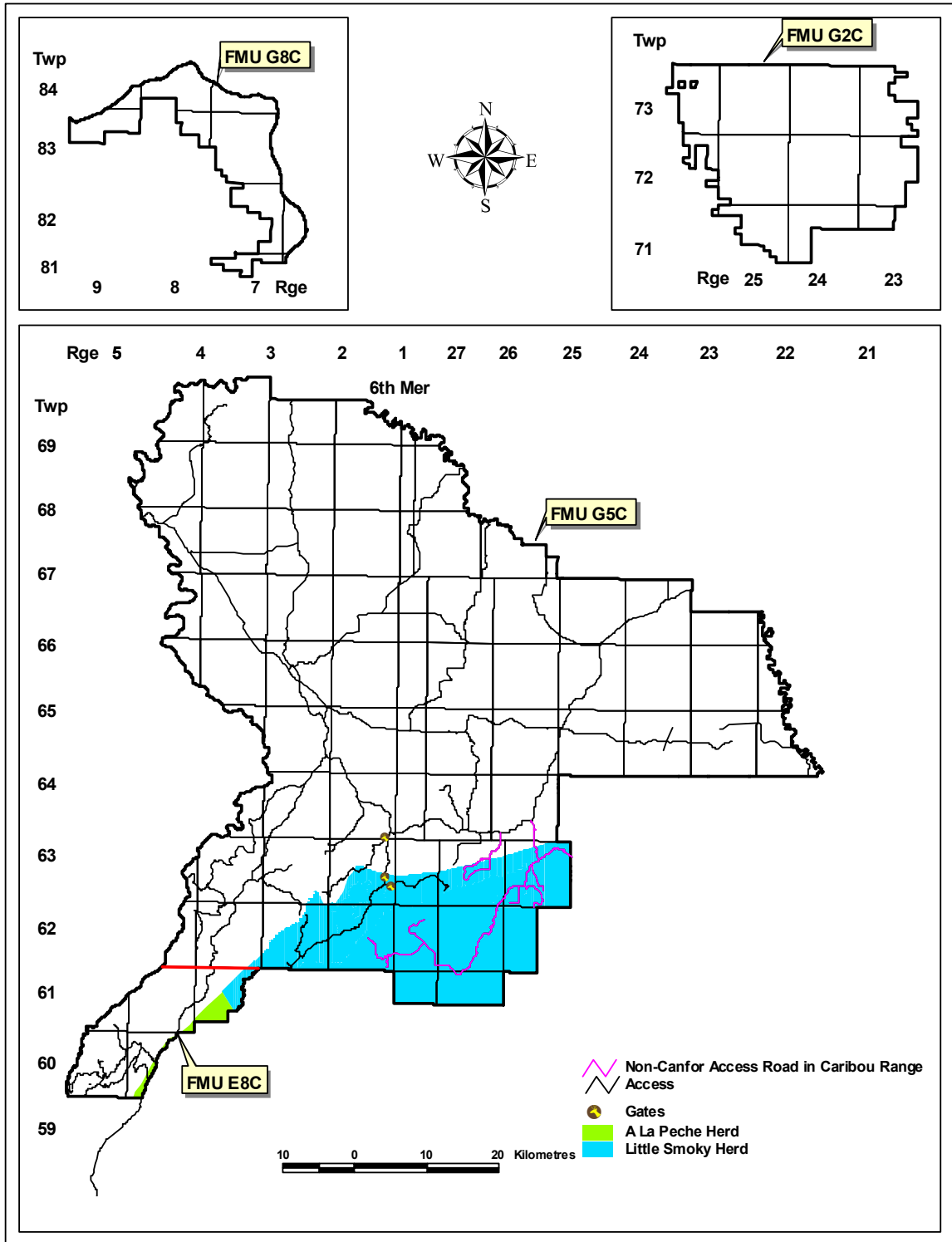


Figure 131. Caribou Area Within the FMA Area

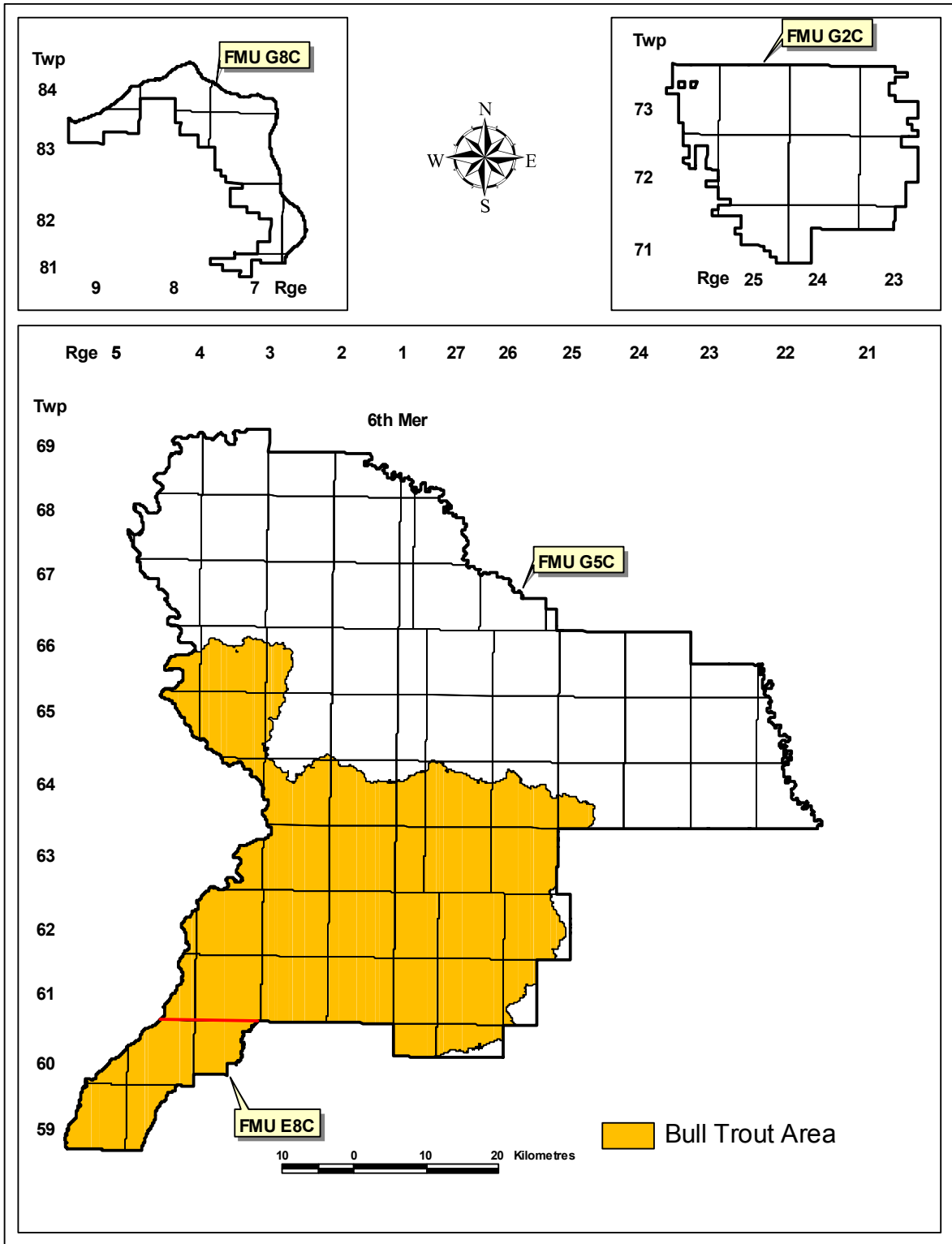


Figure 132. Bull Trout Area Within the FMA Area

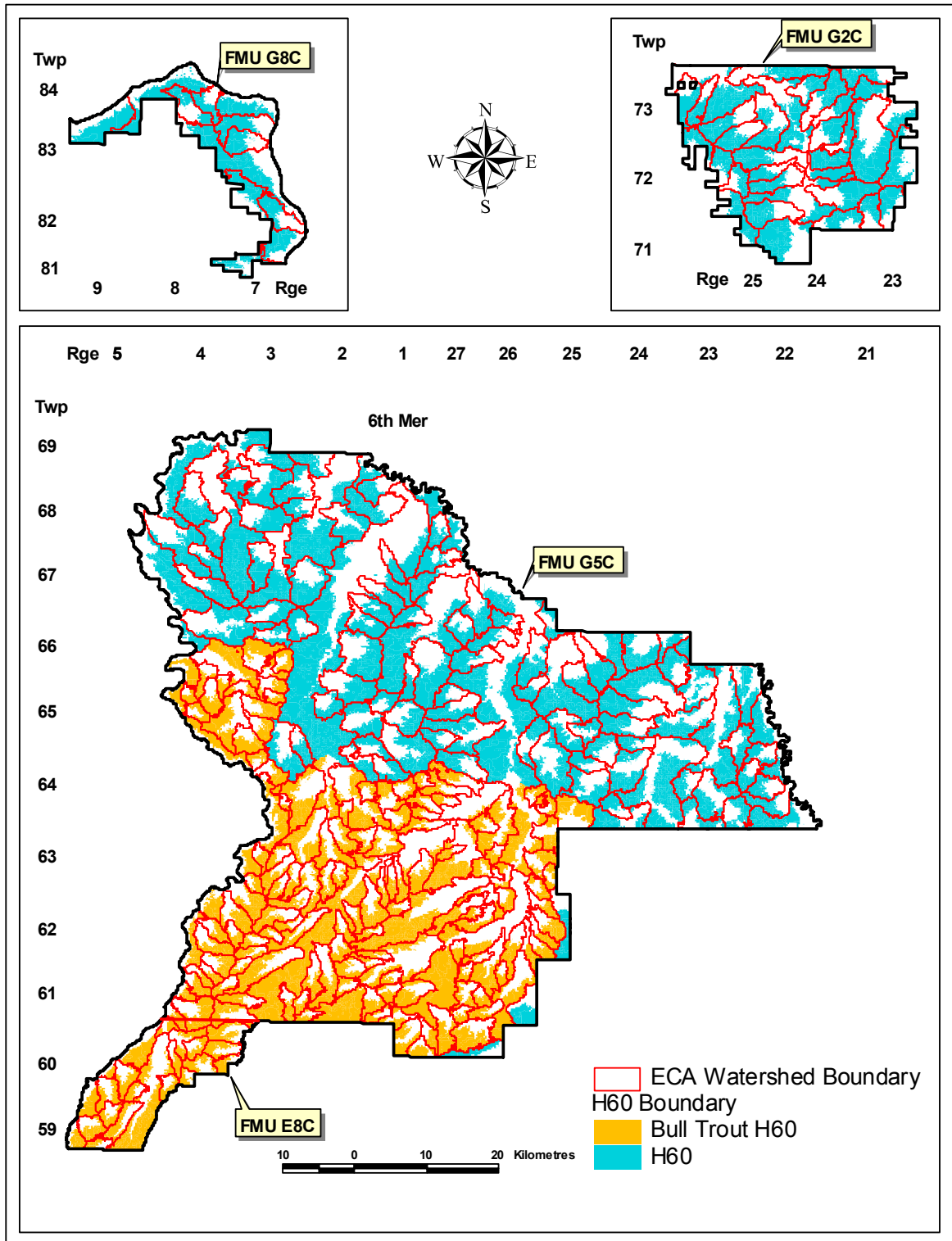


Figure 133. Defined H60 Watershed Map

Table 55. Watershed Above the ECA of 35% Flagged for Concern

ORM_DFMP_Tables.xls

Table 2

Watershed ID	1999 ECA %	2009 ECA %	2019 ECA %
2057 ¹	48	--	--
4257 ¹	36	--	--
5642 ¹	37	--	--
1500 ¹	--	--	41
Combined ECA (ha)	606	0	195
Notes: ¹ Bull trout watershed			

Source: ORM 2001 compiled data

Trumpeter Swan

There are 45 areas that have been identified by Alberta Sustainable Resource Development, Natural Resource Services (NRS) which have been buffered to protect nesting sites in the FMA area (Figure 134).

◆ **Forecasting assumptions and analytical methods**

Woodland Caribou

The constraints, defined under the *Forest management activities*, used in the *Resource and Timber Supply Analysis* will ensure habitat conditions for woodland caribou are not adversely impacted by Canfor's operations.

Bull Trout

It is assumed that streamflow maxima will not adversely impact the ecosystem if no more than 20-40% of the total vegetated cover is removed within the area above the H60 within a defined watershed.

The following will be used to evaluate potential watersheds that may require further adjustments:

- A base 0 (Equivalent Clearcut Area value) has been calculated (Appendix 12 Table 1) which includes the 1999 Annual Operating Plan proposed areas as part of the harvested areas. The need to do this is to demonstrate present ECA values that will not change;
- The ECA percentage report (Appendix 12, Tables 2 and 3) for year 10 (2009) and year 20 (2019) was based on the *Resource and Timber Supply Analysis* (Appendix 3);
- The following criteria will be used to flag areas of concern:
 - ECA >35% in bull trout area; and
 - Visual representation.

For a more detailed discussion regarding ECAs and H60, see Section G "Critical Element 3c, Objective 2.1a.1" or Section G "Critical Element 4a, Objective 1.2a.1". Also refer to Section F 4.1.1.



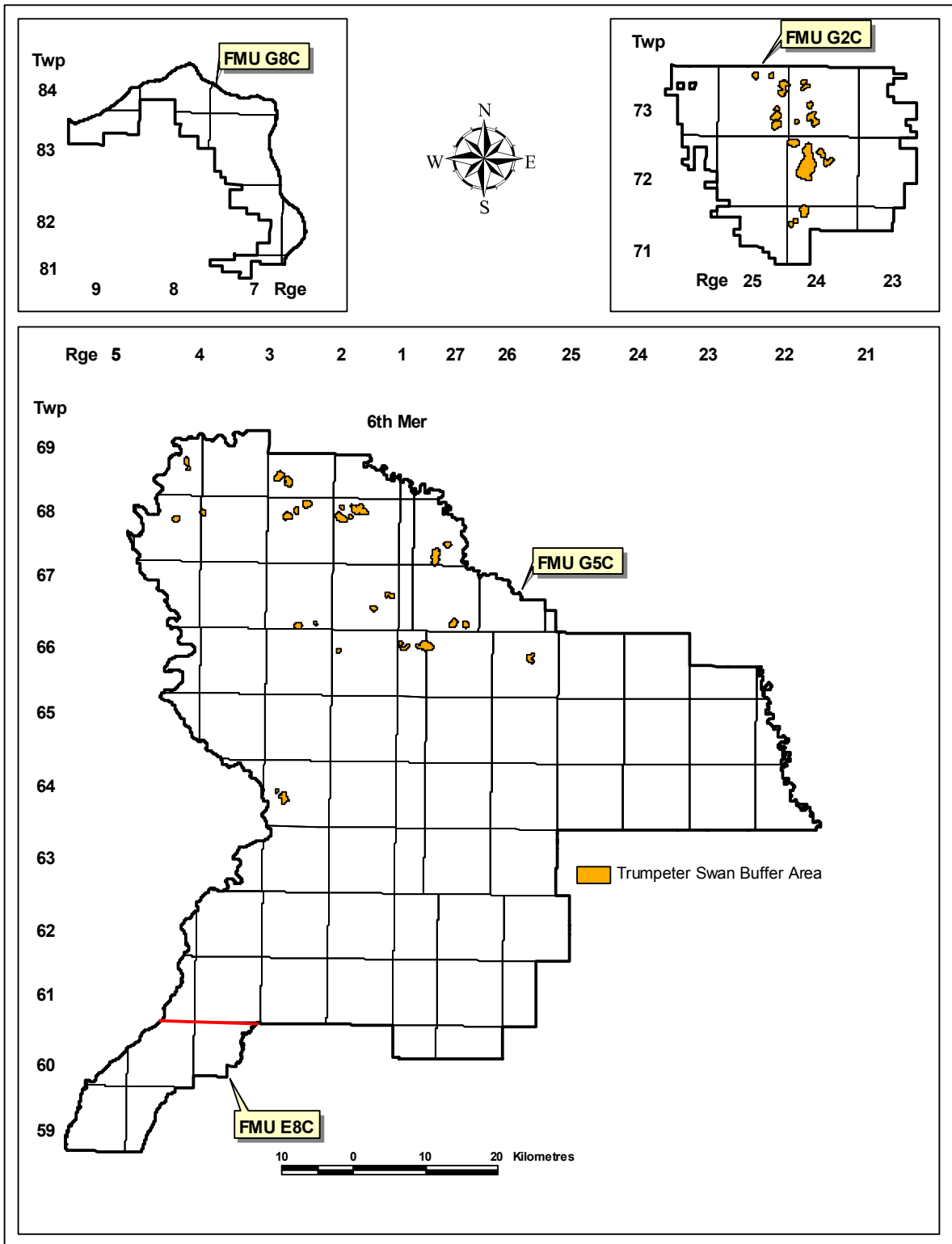


Figure 134. Trumpeter Swan Buffer Area

Trumpeter Swan

Buffer areas will be maintained, unless changes are recommended or approved by the Alberta Sustainable Resource Development, Land and Forest Division (LFD).

◆ **Forest management activities**

Woodland Caribou

Cover constraints are being applied to forested stands identified within the Caribou Area (Figure 131) as follows:

- No more than 20% of the area can be in pioneer or young seral condition;
- No less than 20% of the area can in old seral stage;
- Maximum opening size of 1,000 ha; and
- 30 year green-up.

In addition, Canfor, as a member of the West Central Alberta Caribou Standing Committee (WCACSC), is participating in a 3 to 5 year research program, which began in April 1998 (Rohner and Schmigelow 1999). There are 3 components of this program:

- Predation;
- Forest renewal; and
- Responses to human infrastructure.

Bull Trout

Bull trout habitat is dependent on the amount of vegetated cover within a watershed. Vegetated cover removal must be controlled to maintain adequate habitat. The absolute amount of Equivalent Clearcut Area (ECA) that can be supported without adverse impacts to bull trout is not well understood; it differs depending upon watershed sensitivity. Given this lack of understanding, it is important to monitor the amount of ECAs.

Trumpeter Swan

Two hundred meters of “no harvest” buffers are maintained around identified trumpeter swan areas to protect nesting sites, unless changes are recommended or approved by the LFD.

◆ **Implementation schedule**

Woodland Caribou

The cover constraints are currently being implemented in the Annual Operating Plan (AOP).

Bull Trout

ECA values have been calculated and the data utilized in the 2001 AOP.

Trumpeter Swan

Protection of identified nesting sites has been implemented and will be maintained.



◆ **Monitoring procedure**

Woodland Caribou

- Canfor will monitor the DFMP cover constraints as stated in *the Forest management activities*; and
- The status of the West Central Alberta Caribou Standing Committee management and research program will be monitored. Data resulting from these programs will be used to enhance forest management within the Caribou Area (Figure 131).

Bull Trout

The Equivalent Clearcut Area (ECA) within the defined watersheds will be tracked.

Trumpeter Swan

Verify the presence of nest sites as identified in the active AOP planning areas and incorporate any new nest sites into future plans.

◆ **Linkages between strategic and operational plans**

All new harvesting plans will follow the strategic direction as outlined in this DFMP.

(1b) 1.1c. Indicator

Amount of significant wildlife mineral licks

Significant wildlife mineral licks are areas that tend to be relatively wet and have a concentration of mineral salts that provide nutrition to various wildlife species. In order to be significant, licks must be used by wildlife on a regular basis.

(1b) 1.1c.1 Objective

Protect 100% of identified significant wildlife mineral licks

◆ **Acceptable variance**

The acceptable variance is zero.

◆ **Current status**

Currently, there are approximately 159 wildlife mineral licks protected within the FMA area, representing an area of 480 ha (0.07% of the entire FMA area).

Significant wildlife mineral licks are identified operationally during pre-harvest assessments and block layout. Licks are protected with a 100 m “no harvest” buffer. The licks are identified in the Annual Operating Plan (AOP).

◆ **Forecasting assumptions and analytical methods**

No forecasting or analysis is required.

◆ **Forest management activities**

Management activities include identification, verification and buffering of significant wildlife mineral licks (refer to Section F 8.2.2). New field staff will require training in the identification of wildlife mineral licks.

- ◆ **Implementation schedule**
Protecting wildlife mineral licks is a current practice. Starting in May 2001, a monitoring procedure will be implemented to verify that the objective is being met.
- ◆ **Monitoring procedure**
A minimum of 10% of new identified wildlife mineral licks will be randomly sampled annually after May 2001.
- ◆ **Linkages between strategic and operational plans**
The management practice of identifying, verifying and buffering significant wildlife mineral licks is part of Canfor's Environmental Management System (EMS). Refer to Section E 4.2.

(1b) 1.2 Goal

Maintain flora and fauna on the landscape

The maintenance of flora and fauna on the landscape can be achieved by providing habitat for their life requisites: food, shelter, escape and breeding.

(1b) 1.2a. Indicator

The amount of area in each seral stage at present and key points in time

Seral stage distribution *"is important for the conservation of biodiversity because it enables timber harvests to be planned so as to maintain a full range of successional habitats for wildlife and ecosystem types over the long-term"* (CCFM 1997: p. 2). It is assumed that by maintaining all seral stages on the landscape, habitat is available for all the flora and fauna that require these seral stages.

(1b) 1.2a.1 Objective

Maintain seral stages within the natural disturbance regimes at present and key points in time

The target seral stage distribution is one that approximates the expected distribution created by natural disturbance regimes. The natural disturbance regime has been modelled by using a theoretical fire-return interval.

- ◆ **Acceptable variance**
For this planning horizon (200 years), the acceptable variance is to be within the range of the natural disturbance regimes for seral stages in the FMA area and FMUs (G8C, G2C, G5C and E8C) as indicated in Figures 117 to 120, respectively. The acceptable variance represents a combination of both Natural regions where they occur.

Figures 121 and 122 (Foothills and Boreal Forest Natural regions) are provided only as supplementary information.

The range of natural disturbance is represented by the solid line in Figures 117 to 122, whereas the bar represents the current or projected distributions.



◆ **Current status**

The area of each seral stage by year in the FMA area, FMUs (G8C, G2C, G5C and E8C) and Natural regions (Foothills and Boreal Forest) is provided in Tables 48 to 53, respectively.

Figures 117 to 120 indicate the present and forecasted distributions for the FMA area and FMUs as compared to expected natural distributions. The observed differences are caused primarily by fire prevention and control and by anthropogenic disturbances.

◆ **Forecasting assumptions and analytical methods**

Seral stage distributions under a natural fire regime were modelled by using a theoretical fire-return interval (ORM 2000). The amount of area in each seral stage in the FMA area and FMUs (G8C, G2C, G5C and E8C) has been forecasted on the landbase at each key point in time (Figures 117 to 120). The key points in time are at years 0, 10, 20, 50, 100 and 200, where 1999 represents year 0. It is assumed these time periods provide a reasonable picture of the variability of seral stage over time.

◆ **Forest management activities**

The amount of each seral stage and its distribution will be compared to the amount of seral stage expected from a theoretical fire-return interval. Adjustments will be made to the harvest schedule as required to ensure the desired seral stage distribution is obtained over time

◆ **Implementation schedule**

Preliminary comparisons between current status and the target seral stages have been completed. All future harvesting plans will follow the strategic direction as outlined in this DFMP and will be adjusted as required to meet the desired seral stages over time.

◆ **Monitoring procedure**

The amount of area of each seral stage that is on the landscape will be compared to the expected natural distributions at key points in time.

◆ **Linkages between strategic and operational plans**

All new harvesting plans will follow the strategic direction as outlined in this DFMP.

(1b) 1.2b. Indicator

Presence of rare plants on the FMA area

A rare plant is one that either occurs in a limited area or in small numbers over a large area. On a provincial basis, a rare plant species is one that has a small overall population or is highly restricted to specific habitats and which is susceptible to human changes to the environment (Harms *et al* 1992). Alberta Natural Heritage Information Centre (ANHIC) defines rare plants as those that are ranked S1, S2 and, occasionally, S3 (Gould 1999):

- S1** 5 occurrences or only a few remaining individuals;
- S2** 6-20 occurrences or with many individuals in fewer occurrences; and
- S3** 21-100 occurrences may be rare and local throughout its range, or in restricted range (may be abundant in some locations or may be vulnerable

to extirpation because of some factor of its biology).

Refer to Section F 6 for additional information regarding the status of rare plants within the FMA area.

(1b) 1.2b.1 Objective

Develop a predictive tool to determine the probability of the occurrence of rare plant species on the FMA area

◆ **Acceptable variance**

Ecosites (ecological units) will be assigned a likelihood index or probability of containing rare or endangered plant species. After this index is developed, the variability in the index will be evaluated. However, assigning an acceptable level of variance is not appropriate.

◆ **Current status**

A report has been written that focuses on the potential rare plants in the FMA area (Snyder 1998). This preliminary work is being built upon currently with the development of a predictive tool to determine the probability of occurrence of rare vascular plant species (Canfor 2001f). The benefits to this approach include:

- Showing resource managers the extent of critical rare plant habitats within the FMA area;
- Allowing resource managers to do a direct comparison between critical rare plant habitats and areas of high economic potential; and
- Being the first step towards implementation of a rare plant reporting program.

A total of 59 rare plants were identified in and around the FMA area from a combination of all sources. A list of all 59 individual species is presented in Appendix 8 along with their associated provincial ranks from the ANHIC. Of the 59 rare plants, there are 5 shrubs, 33 forbs, 10 grasses and 11 mosses. Twenty five percent of the total rare plants found are in the composite, grass and willow families. The remaining 75% of plants had representation in 27 other families for a total of 30 observed families. (Refer to Section F 6 for additional information regarding rare plants).

◆ **Forecasting assumptions and analytical methods**

Geographic Dynamics Corp (GDC) used the following steps to determine the likelihood of finding a rare plant in a vegetation complex. For a full description of the methodology and results, refer to the report *Plant Resource Evaluation* (Canfor 2001f).

Step 1: Habitat Evaluation

The habitat preferences of each rare plant species were determined through literature and database review. Each plant was linked to a specific environment and habitat type.

Step 2: Determine likely ecosites



The ecosites in which each rare species would likely be found is determined by comparing the environmental requirements of each species to the ecosite descriptions for the FMA area.

Step 3: Determine species-ecosite scores and ecosite scores

Each species is assigned a species-ecosite score (SES). This score is based on the number of ecosites in which a given species would be found relative to the total number of ecosites in that subregion.

Step 4: Generate area-weighted ecosite scores

A final ecosite score is calculated as a percentage of the maximum possible ecosite score for a more meaningful comparison.

Step 5: Relate area-weighted ecosite scores to the vegetation complex level of resolution.

Within each vegetation complex in the FMA area, the total area of each mapped ecosite and ecosite complex was queried to determine the likelihood of finding a rare plant within a vegetation complex are mapped and presented by block.

◆ **Forest management activities**

Based on GDC's report, Canfor has developed a procedure to identify and report rare plants found during routine operational activities. GDC presented a rare plant identification and reporting course to operational personnel in June 2001. Skills learned at this course will be used to identify rare plants. Canfor's procedure for reporting a rare plant discovery are as follows:

- Map and mark the field location;
- Describe the plant in detail;
- Describe the surroundings with details;
- Take a photograph, if camera available;
- Collect a specimen only if there is an abundant number of species; and
- Fill out the *Native Rare Plant Report Form* and submit it to Alberta Natural Heritage Information Centre (ANHIC).
- When "rare" plants are found within operational areas, harvest will be deferred until an expert can be retained to provide management recommendations. The recommendations will be evaluated and implemented based on the specifics of the case.

◆ **Implementation schedule**

The objective has been achieved as of June 2001. Alberta Natural Heritage Information Centre (ANHIC) is currently developing a field manual for the identification of rare plants, which will be evaluated to determine its role in Canfor's Rare Plant Reporting program.

◆ **Monitoring procedure**

Canfor will periodically compare the list of rare plants in the GDC report to the ANHIC list to reconfirm their status.



- ◆ **Linkages between strategic and operational plans**

The rare plant reporting program will be implemented as outlined in this DFMP.

(1b) 1.2c. Indicator

Presence of endangered or threatened wildlife species ('At Risk' and "May Be At Risk" listings) on the FMA area

For the purpose of this plan, the classification of endangered or threatened wildlife species are designated as the provincial 'At Risk' and 'May Be At Risk' listed species. The wildlife species that are classified as endangered or threatened are those species that no longer have the capability to withstand the cumulative effects of habitat loss, isolation and increased competition. These species also tend to be sensitive to human disturbance. Their populations have either declined or are in danger of declining to non-viable levels throughout their distribution ranges, making them the most vulnerable portion of Alberta's biodiversity. These species are placed on a status designation list (Alberta Environment 2000a).

(1b) 1.2c.1 Objective

To develop management strategies to address the identified endangered or threatened wildlife species on the FMA area

Canfor has a preliminary list (Snyder 1997) of endangered or threatened ('At Risk' or 'May Be At Risk' listed) wildlife species that may occur in the FMA area and will be reviewing that list and developing management strategies for those species occurring in the FMA area.

- ◆ **Acceptable variance**

Acceptable variance is zero with respect to the development of management strategies to address the identified endangered or threatened wildlife species.

- ◆ **Current status**

Canfor commissioned a report on habitat requirements for animal species of special management concern 1997. Included within the report is an interim list of endangered or threatened wildlife species that may occur on Canfor's FMA area with a preliminary management recommendation written up for each species (Snyder 1997). This list was used to help develop the 7 selected indicator species discussed in "Critical Element 1b, Indicator 1.1b".

Canfor has since developed specific management strategies for woodland caribou and trumpeter swan, which are 'May Be At Risk' listed (Alberta Environment 2000a). These management strategies are discussed in "Critical Element 1b, Objective 1.1b.2".

In the interim, Canfor will continue the coarse filtered approach to wildlife management. This approach assumes that if habitat is maintained and available for the 7 identified selected indicator species, then the FMA area will contain a wide range of habitat conditions suitable of many other species.



- ◆ **Forecasting assumptions and analytical methods**
Forecasting for woodland caribou and trumpeter swan is described in “Critical Element 1b, Objective 1.1b.2”. The remaining ‘At Risk’ and ‘May Be At Risk’ species will be forecasted once management strategies are defined.
- ◆ **Forest management activities**
The current provincial (Alberta Environment 2000a) and national lists (CESCC 2001) and Canfor’s preliminary lists of endangered or threatened wildlife species will be used to assess which species occur in the FMA area.

Strategic and operational strategies will be developed and implemented for species that have not currently been addressed to ensure the Company’s operations do not adversely affect the habitat for endangered and threatened wildlife species.
- ◆ **Implementation schedule**
Confirmation of the preliminary list of the potential endangered and threatened wildlife species in the FMA area, as well developing the strategic and operational strategies for those species not currently addressed, will be developed by May 2002.
- ◆ **Monitoring procedure**
The progress in implementing the schedule will be reported in the *Annual Performance Monitoring Report*.
- ◆ **Linkages between strategic and operational plans**
When management strategies are developed, they will be incorporated into future strategic and operational plans.

(1b) 1.2d Indicator

Type, amount and location of habitat required for selected indicator species

Four indicator species within the FMA area have been selected for HSI modelling through consultation with members from the Forest Management Advisory Committee (FMAC), the Forest Ecosystem Management Task Force and Canfor.

- Moose (*Alces alces*);
- American marten (*Martes americana*);
- Pileated woodpecker (*Dryocopus pileatus*); and
- Barred owl (*Strix varia*).

These species were selected because they represent a broad and variable range of habitat characteristics. HSI models offer an opportunity to review the selected indicator species through a fine- filter approach.

(1b) 1.2d.1 Objective

Compile a list of habitat requirements for selected indicator species within Canfor’s FMA area

The techniques used to evaluate the suitability of habitat for specific species are called habitat suitability index (HSI) models. They are able to predict the value of



a habitat to a specific species, based on life variables related to food, availability of cover and the physical size of the potential habitat.

◆ **Acceptable variance**

The acceptable variance for the 4 selected indicator species is to maintain the carrying capacity within -10% of the current status at key points in time (0, 10, 20, 50, 100 and 200 years).

The solid line in Figures 123 to 126 represents the acceptable variance for all 4 selected species. The bars represent the current and projected carrying capacities.

◆ **Current status**

The current (year 1999) HSI-Class percentages (nil, low, medium and high) for moose, American marten, pileated woodpecker and barred owl are shown in Figures 127 to 130, respectively. The data is shown for the entire FMA area and by FMUs (G8C, G2C, G5C and E8C).

◆ **Forecasting assumptions and analytical methods**

The assumptions of the HSI models themselves are described in Beck *et al* (1996) and De La Mare (1998) and Takats (1997). The key assumptions of the HSI models being used are:

- A larger area of poorer habitat is equivalent to a smaller area of higher quality habitat;
- The quantity and quality of habitat can be used to estimate the maximum potential number of animals that it is able to support; and
- The data available to drive the model is representative of the actual conditions.

It is assumed that if habitat is available for these selected indicator species then, because of their varied habitat requirements, a relatively wide range of habitat conditions are present in the FMA area.

◆ **Forest management activities**

In order to apply the HSI models, the relationship between important habitat characteristics and stand variables was evaluated and habitat values determined for each 20-year breast height age class for each yield group (Canfor 1999c). The habitat models have been applied to the landscape at key points in time (0, 10, 20, 50, 100 and 200 years) to determine the amount of potential habitat available (carrying capacity) for the selected species.

The change in carrying capacity over time for moose, American marten, pileated woodpecker and barred owl is demonstrated in Figures 123 to 126. The data is shown for the entire FMA area and by FMUs (G8C, G2C, G5C and E8C).

These results must be interpreted as modelled estimates of future conditions and are used for monitoring and changing operational and strategic practices within an adaptive management plan. Decreases in carrying capacity may be caused by physical changes within the FMA area, or they may be a result of measurement and analysis limitations given the complexity of habitat modelling.

Further evaluation of carrying capacities that fall below the acceptable variance will be conducted. If the predicted drop is related to management activities, operational and strategic plans will be adjusted to ameliorate any negative impact. Canfor's Permanent Sample Plot program will help understand the dynamics of snags and stubs and it will also provide data to fill in the gaps currently present in the modelling data set.

Canfor will work closely with the Alberta Sustainable Resource Development, Land and Forest Division (LFD) and Natural Resources Service (NRS) and the Forest Management Advisory Committee (FMAC) to avoid management practices that place selected indicator species at risk (Canfor 1997).

Canfor is also working on models that utilize an HSI type approach to evaluate wildlife habitat at the landscape level (1:100,000 scale). These models represent a variety of indicator wildlife species grouped into guilds (Canfor 1998b) and will then be applied at key points in time. If potential problems are identified, information from this new landscape level habitat evaluation project will provide insight into the development of preventative and mitigative strategies.

- ◆ **Implementation schedule**

The HSI models are reported in this DFMP.

The new landscape level habitat evaluation project has been rescheduled for completion by the end of September 2001; however validation and testing of the model results and development of operational strategies will be completed by May 2003.

- ◆ **Monitoring procedure**

Harvesting activities will be monitored (as per the forest management activity above) to ensure that they follow the management strategies defined in this DFMP.

- ◆ **Linkages between strategic and operational plans**

All new harvesting plans will follow the strategic direction as outlined in this DFMP.

(1b) 1.2d.2 Objective

Review the list of selected indicator species regarding potential addition of an amphibian species

The current list of selected indicator species includes representatives of birds, mammals and fish. It has been noted by FMAC that amphibians are not part of the list and they should be considered for future planning purposes.

- ◆ **Acceptable variance**

The acceptable variance is zero with respect to the review of the list of selected indicator species regarding the potential addition of an indicator species for amphibians.

- ◆ **Current status**

Seven selected indicator species have been identified in "Critical Element 1b, Indicator 1.1b".



- ◆ **Forecasting assumptions and analytical methods**
No forecasting or analysis will be done until the review has been completed.
- ◆ **Forest management activities**
The process for selection of an amphibian selected indicator species requires further assessment and consultation with experts.
- ◆ **Implementation schedule**
The review will be completed in conjunction with the implementation schedule as per “Critical Element 1b, Objective 1.2c.1”.
- ◆ **Monitoring procedure**
The progress in implementing the schedule will be reported in the *Annual Performance Monitoring Report*.
- ◆ **Linkages between strategic and operational plans**
When management strategies are developed, they will be incorporated into future strategic and operational plans.

(1c) Critical Element

Genetic Diversity

Genetic diversity is conserved if the variation of genes within species is maintained.

(1c) 1. Value

Genetic diversity

(1c) 1.1 Goal

Conserve genetic diversity of tree species

Regeneration will originate from 3 seed sources: authorized seed zones, breeding programs and natural ingress. Regardless of the seed source, a diversity of genotypes will be represented.

(1c) 1.1a. Indicator

The effective number of unrelated genotypes (trees) in the breeding program

A genotype is the genetic constitution of an organism. In order to maintain genetic variability, there has to be an effective number of unrelated genotypes in the breeding program. This will ensure there is sufficient variability in the gene pool so trees can adapt to environmental stresses and change. The linkage between diversity and adaptation is well recognized in conservation biology and tree improvement, as genetic diversity is the raw material from which adaptations are derived through natural selection and other evolutionary forces (Edwards *et al* 1999b).

(1c) 1.1a.1 Objective

To maintain between 300-600 genotypes in breeding programs to safeguard long-term diversity

◆ Acceptable variance

The number of genotypes for each tree species in the breeding programs will be between 300 and 600.

◆ Current status

Canfor participates in the B1 lodgepole pine breeding program in partnership with Weyerhaeuser, Alberta Newsprint Company Ltd. and Alberta Sustainable Resource Development, Land and Forest Division (LFD). They also participate in the G1 white spruce breeding program in association with Weyerhaeuser and the LFD.

The goal for both programs is to provide a secure source of seed and propagation material to produce trees with fast growth, good general health,



good form and undiminished wood quality. The primary objectives of the programs are to (Edwards *et al* 1999a and b):

- Provide genetically improved material for reforestation;
- Achieve optimum economic gain per unit of time;
- Predict, obtain and verify genetic gains as quickly as possible; and
- Maintain genetic diversity and long-term adaptive capability through a sufficiently large mainline breeding population, an elite production population and genetic archives (clone bank).

Another key objective is to maintain flexibility for future breeding cycles to accommodate unforeseen economic, industrial, political, climatic or biological changes. Participants in the breeding programs are continually looking for superior trees to add to the programs. These trees come from within the breeding region, which ensures that they are adapted to the climate, soils, diseases and pests within the Grande Prairie biogeoclimatic zone.

The B1 lodgepole pine breeding program has achieved the objective of having between 300 and 600 genotypes in the breeding program with 459 genotypes currently in the program (Edwards *et al* 1999b). In 1998-1999, 100 trees were added to increase the geographic coverage of the parents and the overall genetic variability in the program.

In the G1 white spruce breeding program, 218 parent trees have been intensively grafted into clone banks at Smoky Lake (Edwards *et al* 1999a). A further 140 non-intensive selections are planned to improve the geographic coverage and broaden the genetic base; these will be made when a good cone crop occurs. This will bring the total number of genotypes in the white spruce program to 358.

◆ **Forecasting assumptions and analytical methods**

The main assumption is that 300 to 600 genotypes in the breeding program for each tree species is sufficient to safeguard long-term genetic diversity. Preliminary analyses indicate that this range of genotypes is sufficient to capture the natural genetic diversity in the FMA area. Including more genotypes would yield relatively little additional protection.

As an additional safeguard, ingress and unharvested ecosystems will provide additional genetic variability.

◆ **Forest management activities**

A further 140 non-intensive selections are planned for the G1 white spruce program to improve the geographic coverage and broaden the genetic base; these will be made when a good cone crop occurs. A description of this activity is provided in Section F 15.11).

◆ **Implementation schedule**

In August 1999, FMU G2C and the northern portion of FMU G5C had a sufficient cone crop for white spruce to enable collection of 30 additional trees. When the southern portions of FMU G5C have a sufficient cone crop, 40 additional trees will be collected. Weyerhaeuser is required to collect 70

trees. All trees selected are registered with Alberta Sustainable Resource Development (ASRD) as they are collected.

- ◆ **Monitoring procedure**
Work Plan reports for both the B1 lodgepole pine and G1 white spruce programs are prepared annually. These reports will specifically state the number of genotypes in the breeding programs for each tree species.
- ◆ **Linkages between strategic and operational plans**
Not applicable.

(1c) 1.1b. Indicator

The effective number of unrelated genotypes (trees) maintained in the seed orchard

Maintaining a sufficiently large effective number of unrelated trees in the seed orchard maintains the genetic diversity of the orchard.

(1c) 1.1b.1 Objective

To maintain sufficiently large and balanced orchard populations of unrelated trees (20-60 genotypes) to safeguard diversity in a given seed orchard

Effective number is a measure of the relative contribution of each genotype to a given seedlot as well as of the number of genotypes. Any imbalance in genotypic representation is compensated for by increased number of ramets (or seedlings) per genotype (or family).

Progeny tests of all parents will be conducted within the tree breeding programs. This will provide a population for intensive selection of parents of the next generation seed orchard. Subsequent interbreeding and selection will provide continued progress and the expansion of the current breeding population currently under way will ensure long-term maintenance of genetic diversity (Edwards *et al* 1999b).

- ◆ **Acceptable variance**
The acceptable variance is zero for maintaining the minimum number of clones (20). However, more than 60 clones are acceptable.
- ◆ **Current status**
The orchard for both the B1 lodgepole pine and G1 white spruce programs is located outside the FMA area near Huallen, Alberta. Both programs currently have at least 89 genotypes represented.
- ◆ **Forecasting assumptions and analytical methods**
It is important to balance genetic gains (generally measured in yield) with genetic variability. Selecting superior parents from geographically dispersed areas within the breeding region will increase the likelihood of having relatively high genetic diversity within the breeding program.
- ◆ **Forest management activities**
The selections for both species for phase 1 orchards are complete. The partners in both programs are in the process of implementing the phase 2

(2nd generation) breeding programs as described in the work plans (Edwards *et al* 1999a and b).

- ◆ **Implementation schedule**
The work plans developed for each species identify the activities and timelines of the breeding programs (Edwards *et al* 1999a and b). Work plans for both are revised annually.
- ◆ **Monitoring procedure**
Precise records are maintained for all components of the program. All trees (clones) selected for the programs are also registered with Alberta Sustainable Resource Development.
- ◆ **Linkages between strategic and operational plans**
Not applicable.

(1c) 1.1c. Indicator

The amount of area planted with non-seed orchard stock

A majority of the seedlings planted in the FMA area is from bulk seed collected from natural stands throughout the FMA area. The utilization of seed from natural stands helps to maintain the natural level of genetic variability that has evolved over time within the FMA area.

(1c) 1.1c.1 Objective

To plant 30% of the FMA area cut units with the bulk seed collection and 70% with seed orchard stock within the following Natural subregions: Central Mixedwood, Dry Mixedwood and Lower Foothills

- ◆ **Acceptable variance**
The acceptable variance is to plant not more than 70% of the harvested area with seed orchard seed on a 5-year average.
- ◆ **Current status**
The B1 lodgepole pine program trees in the seed orchard have been rouged and crown management has commenced. It will be 3 years before the orchard is in full seed production. Consequently, only a small amount of seed will be available each year for growing pine planting stock.

Seed production from the G1 white spruce program has just commenced and it is anticipated that full production will be realized within the next 3 to 5 years. Until the production of seed from the seed orchard is available, harvested areas will be planted with seedlings grown from seed from bulk collections.

Natural ingress plays a role in genetic diversity. Seedlings establish naturally from cones left on site after harvest, from seed from neighbouring stands, from advanced growth and seedlings remaining on site after harvest.
- ◆ **Forecasting assumptions and analytical methods**
Not applicable.

- ◆ **Forest management activities**
The bulk seed collection activities must continue to provide adequate seed for reforestation purposes. Individual seed collection and seed deployment must occur within a specific seed zone unless approved by the Land and Forest Division (LFD). Refer to Section F 15.11.3.
- ◆ **Implementation schedule**
The distribution of the seed resource for production of seedlings and planting will be implemented, within 3 years for pine and 3-5 years for spruce, as seed orchard seed becomes available.
- ◆ **Monitoring procedure**
The area planted with seedlings derived from the bulk seed collections and the area planted with stock grown from seed from the orchard will be reported in the *Annual Performance Monitoring Report*.
- ◆ **Linkages between strategic and operational plans**
All new silviculture prescriptions will follow the strategic direction as outlined in this DFMP.

(1c) 1.1d. Indicator

The number of mother trees represented in the bulk seed collections over a ten-year period

The greater the number of genetically distinct mother trees (obtained from wild seed collection) represented in the bulk seed collection, the higher the genetic diversity in the collection.

(1c) 1.1d.1 Objective

To include cones of at least 400-750 mother trees for the bulk seed collections for lodgepole pine and white spruce and 50-150 mother trees for black spruce over a ten year period

- ◆ **Acceptable variance**
The acceptable variance is zero for maintaining a minimum of 400 mother trees for lodgepole pine and white spruce and a minimum of 50 mother trees for black spruce.
- ◆ **Current status**
Seed from white spruce is collected from approved seed zones that possess relatively homogeneous biological, climatic and geological conditions. Seed for lodgepole pine and black spruce is collected from within 80 km and 150 m in elevation of the planting site. The seedlings grown from the seed taken from a specific seed zone or area are planted in the same seed zone or area to which they have adapted, thereby ensuring they will survive and prosper.

Canfor maintains a variety of records regarding seed collections but does not currently track the number of mother trees. Canfor estimates however that seed has been collected from 10,379 mother trees of lodgepole pine, 742 of white spruce and 40 of black spruce. These estimates are based on Canfor's



supply of seed at the Alberta Tree Improvement and Seed Centre (as of September 1, 1999).

- ◆ **Forecasting assumptions and analytical methods**
Not applicable.
- ◆ **Forest management activities**
When a sufficient seed crop occurs, collections will be made to increase the number of mother trees for black spruce. Collections of seed for the remaining species will be made as dictated by seed supplies
- ◆ **Implementation schedule**
The mother tree tracking system will be implemented during the next collection of seed, which depends on the need for seed, and the presence of a sufficient seed crop.
- ◆ **Monitoring procedure**
A record of the mother trees of each species represented in the bulk seed collection and the location and seed zone that the seed came from will be maintained on file.
- ◆ **Linkages between strategic and operational plans**
The *Detailed Forest Management Plan* (DFMP) will be a guide for operational staff regarding the use of seedlings grown from the bulk seed collections.

(1c) 1.2 Goal

Maintain conditions that do not negatively impact on genetic diversity of wildlife species

(1c) 1.2a. Indicator

Landscape structure

Maintenance of landscape structure will manage the distribution and abundance of wildlife species and thereby is anticipated to maintain genetic diversity. The spatial properties or “structure” of landscapes can be used as a surrogate measure of landscape level biodiversity values. To maintain the biodiversity of an area, land managers are challenged with managing landscapes to emulate the patterns and dynamics of natural landscape mosaics. Thus, the quantitative basis for measuring the structure of landscapes is a prerequisite for ecosystem-based forest management. Quantitative measures are required to establish objectives for landscape structure and evaluate the effects of management options on ecosystem values.

At the landscape level, there are a number of important factors relating to the conservation of genetic diversity of wildlife species. Landscape composition and spatial configuration define landscape structure. Composition is generally described by seral stage distribution (habitat type) and patch size distribution (habitat size), while configuration is represented by fragmentation, connectivity and patch shape.

The general consensus regarding the overall hierarchical structure of biological diversity suggests that higher levels of ecological organization, such as the

landscape or ecosystem levels, ultimately limit the lower levels in the hierarchy, including the species or genetic levels (Gaines *et al* 1999). Thus, landscape structure has an important function in the flow and exchange of genetic material and, ultimately, in the conservation of genetic diversity. Ecological systems are continually changing over time and are influenced by various natural and human-caused disturbances. Thus, both the temporal and spatial scales must be considered when developing a means to evaluate and monitor genetic diversity.

Landscape structure is described by various landscape properties; therefore, it is necessary to identify indices that will be used to measure these properties. For detailed discussion around the distribution of seral stages please refer to the Section “Critical Element 1a, Objective 1.2b.1”. The distribution of patch sizes is reported by 0-100 ha, 100-500 ha and 500+ ha classes. These classes were defined based on extensive literature review and the maximum 500 ha aggregation rule (1,000 ha in the Caribou Area) in the *Resource and Timber Supply Analysis* (Appendix 3). Fragmentation is measured by mean patch size (MPS). Connectivity is quantified using the mean nearest neighbour distance (MNND). MNND describes the spatial context of a habitat patch in relation to its neighbours by increasing with increasing distance between patches. Patch shape is measured by the area-weighted mean shape index (AWMSI). AWMSI measures the perimeter-to-area ratio for a patch type or landscape using comparisons of patches to a standard shape.

(1c) 1.2a.1 Objective

To compare current landscape structure to future landscape structure at key points in time and develop management strategies

- ◆ **Acceptable variance**

Landscape structure is characterized by various indices; therefore, it is necessary to establish acceptable variance for each measure separately.

Distribution of Seral Stages

Please refer to the section “Critical Element 1a, Objective 1.2b.1” for detailed discussion on the distribution of seral stages.

Distribution of Patch Sizes

Target distributions were derived for the Boreal Forest and Foothills natural disturbance types based on theoretical fire-return intervals of the 2 Natural regions (ORM 2000). Targets for the Boreal Forest Natural region were derived from measured patch size classes of four 20-year periods of unmanaged forests (DeLong and Tanner 1996); while targets for the Foothills Natural region were based on the distribution of patch sizes in historical pre-suppression air photos of the Foothills Model Forest in Hinton, Alberta (Andison 1997). The targets for the reporting units (FMA and FMUs G8C, G2C, G5C and E8C) are weighted based on the proportion of areas in the Boreal Forest and Foothills Natural regions (Table 56).

For this planning horizon (200 years), the acceptable variance is to be within the range of natural disturbance types in the FMA area and FMUs G8C, G2C, G5C and E8C as indicated in Figures 135 to 138. For more information, refer

to *Forecasting assumptions and analytical methods* which provides a detailed explanation of the complexity.

The evaluation of the landscape structure will help determine the present land condition and understand and evaluate any future landscape changes resultant from the proposed management decisions. A brief summary of the methodology for determining the landscape values follows and a full description of is contained within ORM 2001e. The landscape structure values were developed in a two-phase process:

- GIS processing to create coverages and grids for the spatial files; and
- GIS Output processing and *FRAGSTATS*²² calculations.

The final phase is to produce landscape reports containing the information discussed within this section (refer to Figures 135 to Figure 141).

Fragmentation

As MPS (mean patch size) decreases fragmentation increases; therefore, lower limits were established for MPS at the landscape level. MPS will not fall below 25% of the current MPS for the FMA area and each FMU at the key points in time, as indicated by the solid lines in Figure 139.

Table 56. Patch Size Distribution Targets

DMP_Tables.xls
Table 23

Reporting Units	1–100 ha		100–500 ha		500+ ha	
	LL	UL	LL	UL	LL	UL
FMA Area	10	16	14	25	53	82
FMU G8C	14	23	13	25	52	73
FMU G2C	14	23	13	25	52	73
FMU G5C E8C	9	15	14	25	53	83
Notes on Abbreviations:						
LL= Lower Limit; UL= Upper Limit						

Source: ORM compiled data

Connectivity

MNND (mean nearest neighbour distance) will not exceed the maximum MNND (as calculated from the current status plus 25%) for the FMA area and each FMU at the key points in time, as indicated by the solid lines in Figure 140.

Patch Shape

The shape and spatial distribution of cutblocks (pioneer seral stage) affect patch shape and shape complexity at the landscape level. AWMSI (area-weighted mean shape index) will not fall below 2 times the current AWMSI of the pioneer seral stage for the FMA area and each FMU at the key points in time, as indicated by the solid lines in Figure 141.

²² *FRAGSTATS* is a landscape pattern analysis program developed at the Oregon State University

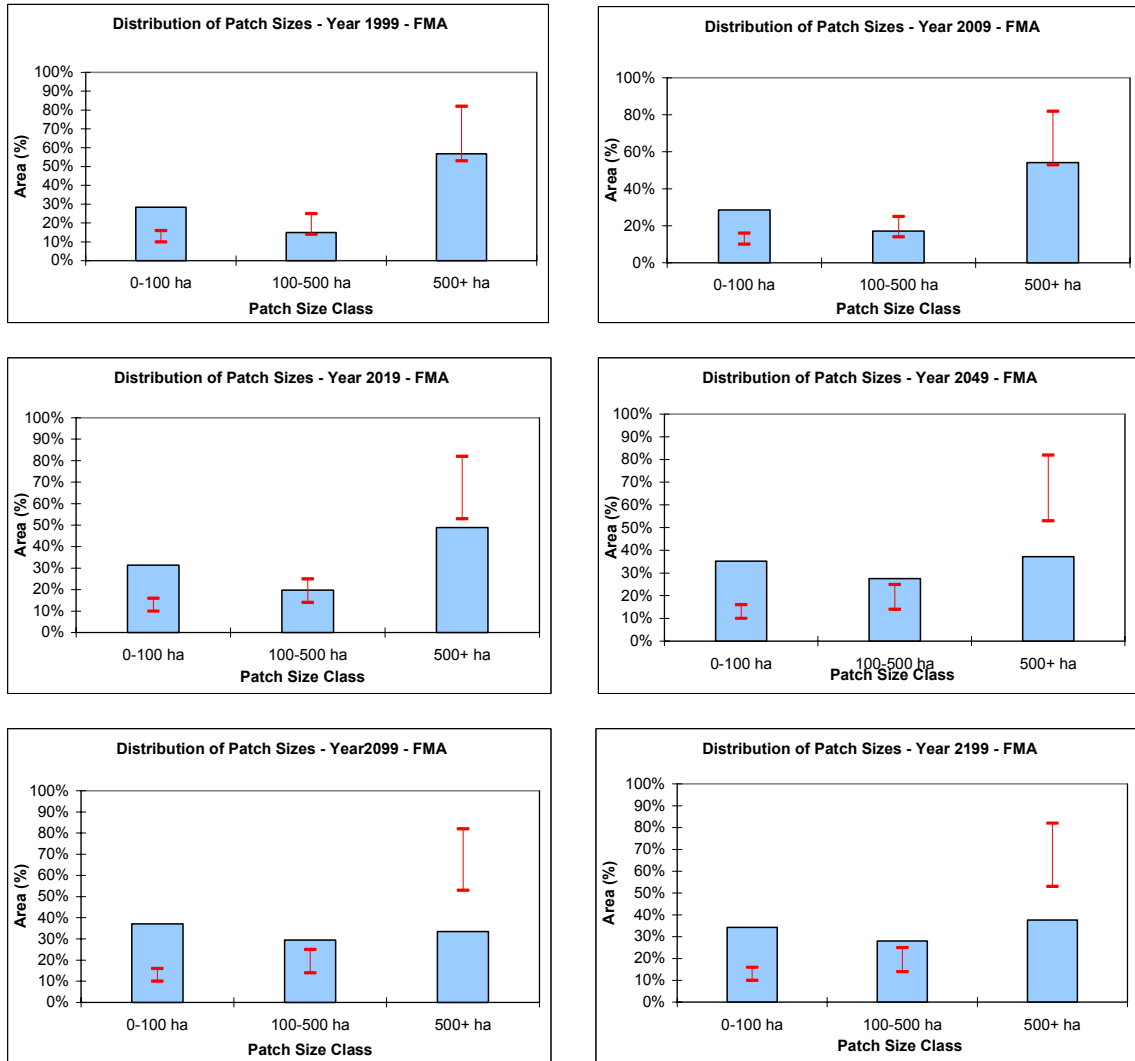


◆ **Current status**

Current status refers to the conditions observed for the year 1999.

Figure 135. FMA Distribution of Patch Size

ORM_DFMP_Tables.xls
Figure 15

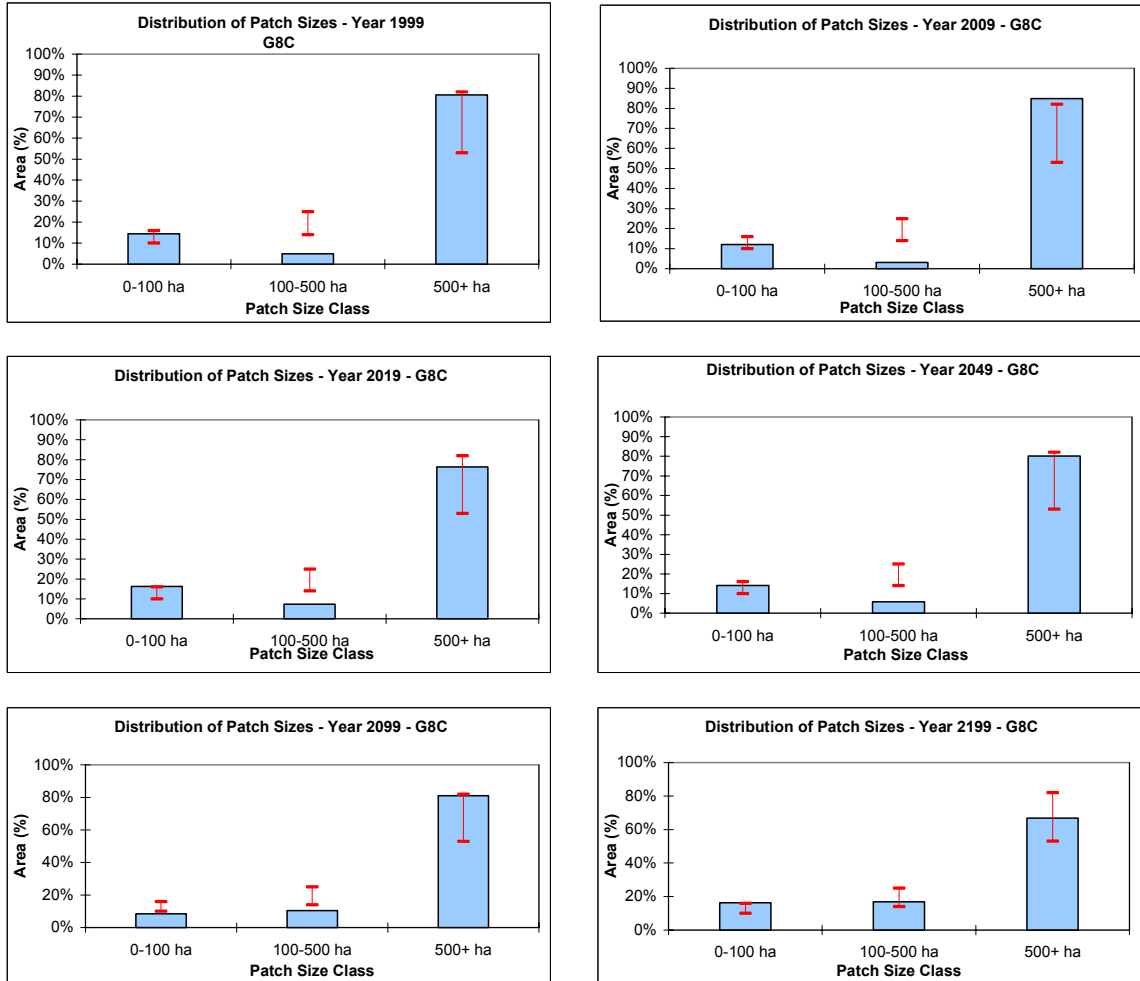


Source: ORM 2001 Analysis



Figure 136. FMU G8C Distribution of Patch Size

ORM_DFMP_Tables.xls
Figure 16

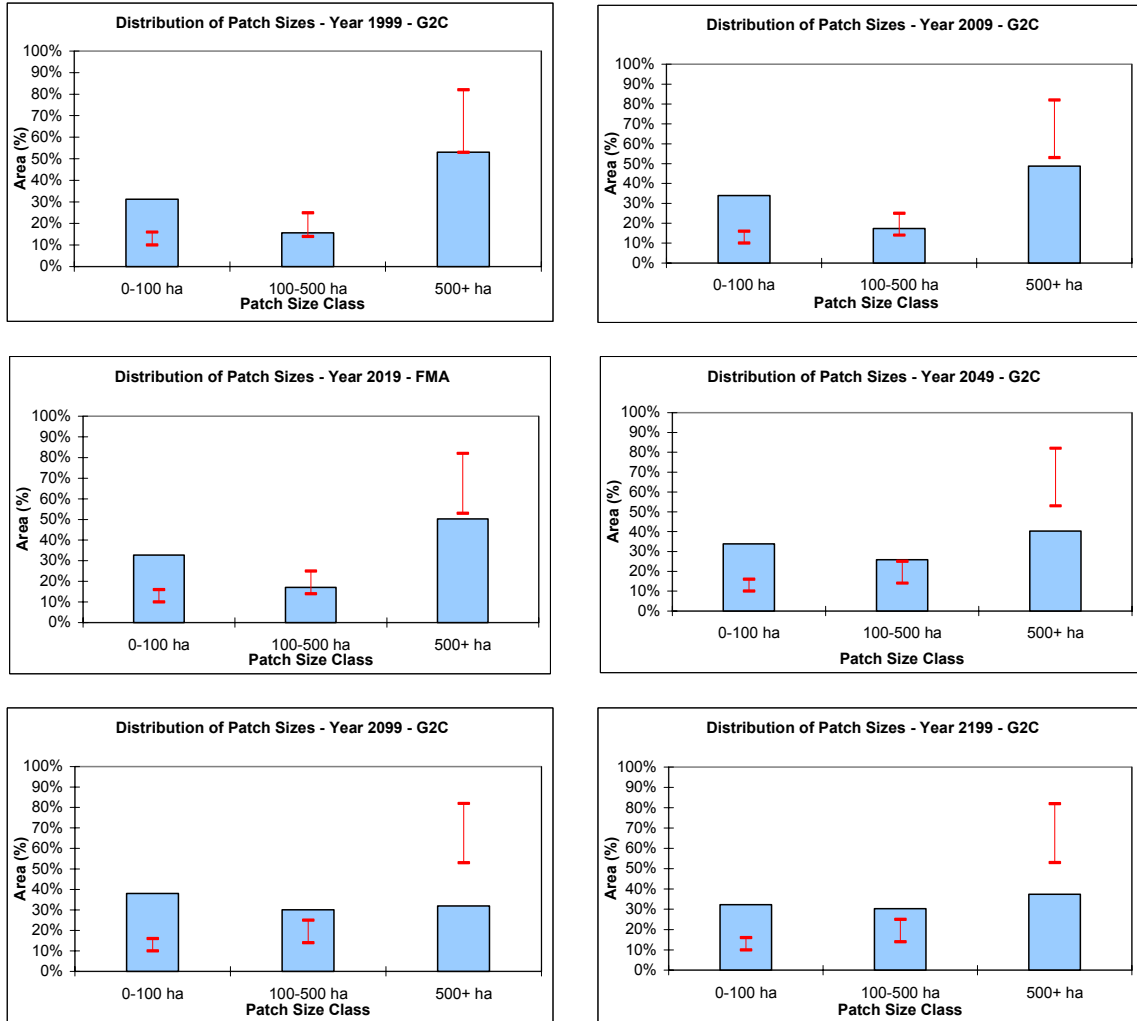


Source: ORM 2001 Analysis



Figure 137. FMU G2C Distribution Of Patch Size

ORM_DFMP_Tables.xls
Figure 17

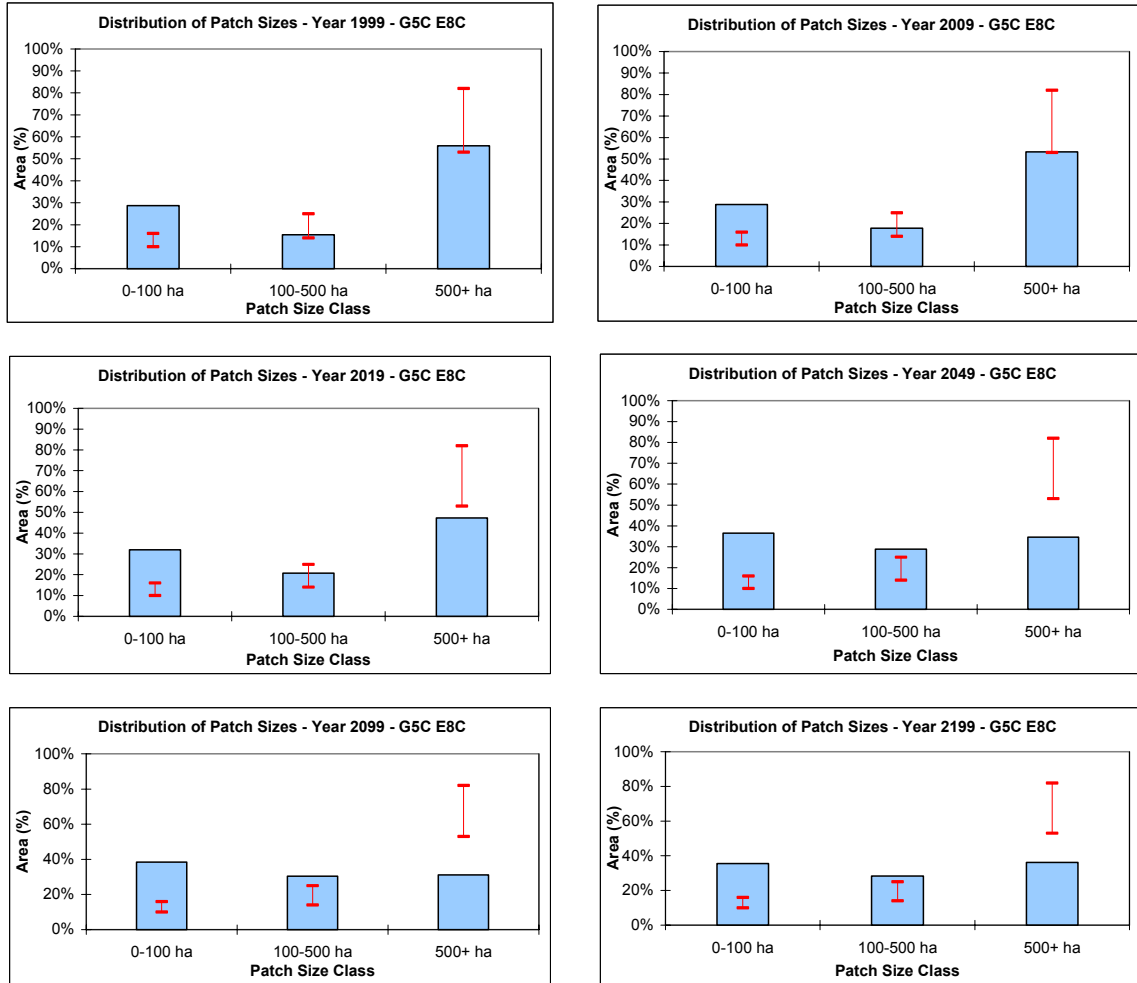


Source: ORM 2001 Analysis



Figure 138. FMU G5C E8C Distribution Of Patch Size

ORM_DFMP_Tables.xls
Figure 18

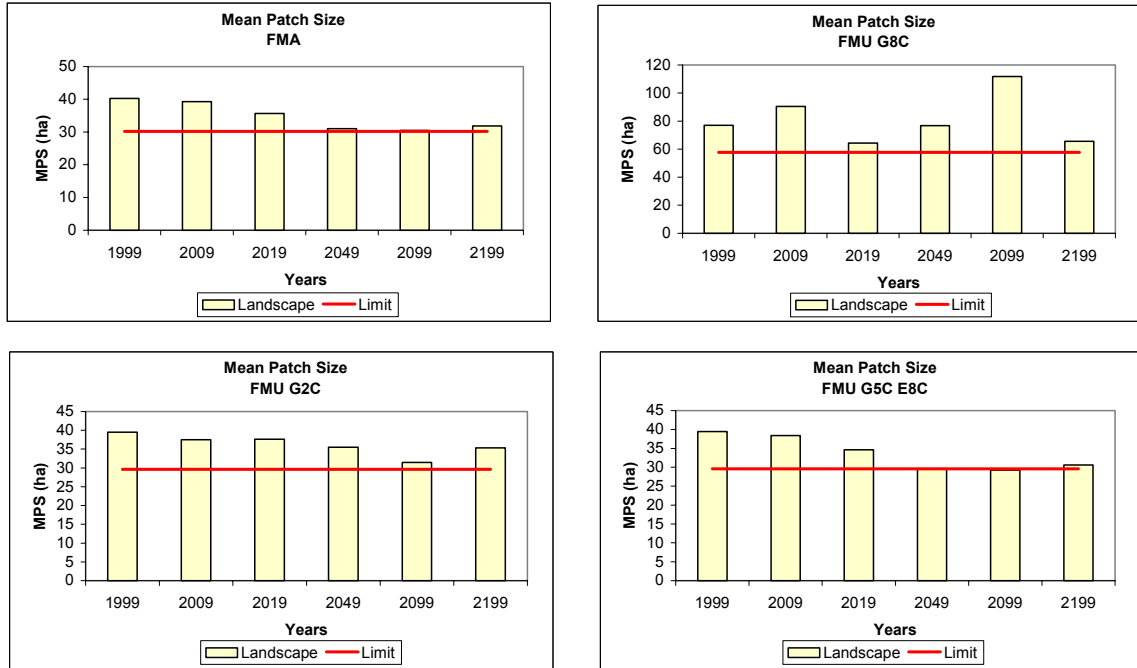


Source: ORM 2001 Analysis



Figure 139. Mean Patch Size for FMA and FMUs

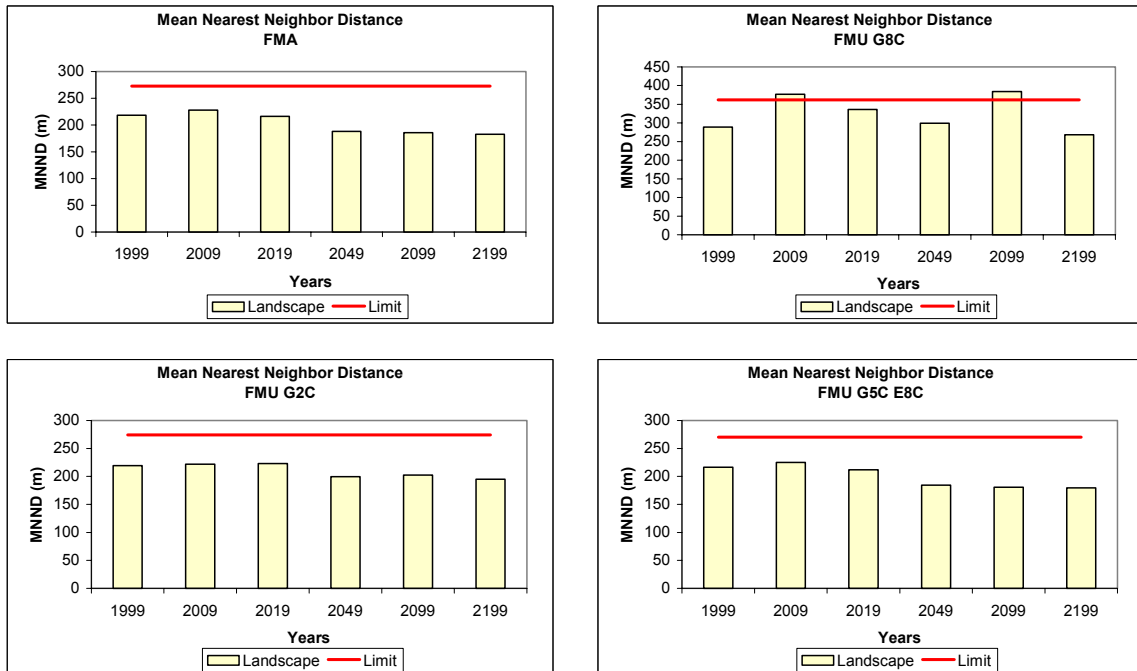
ORM_DFMP_Tables.xls
Figure 19



Source: ORM 2001 Analysis

Figure 140. Mean Nearest Neighbour for FMA and FMUs

ORM_DFMP_Tables.xls
Figure 20

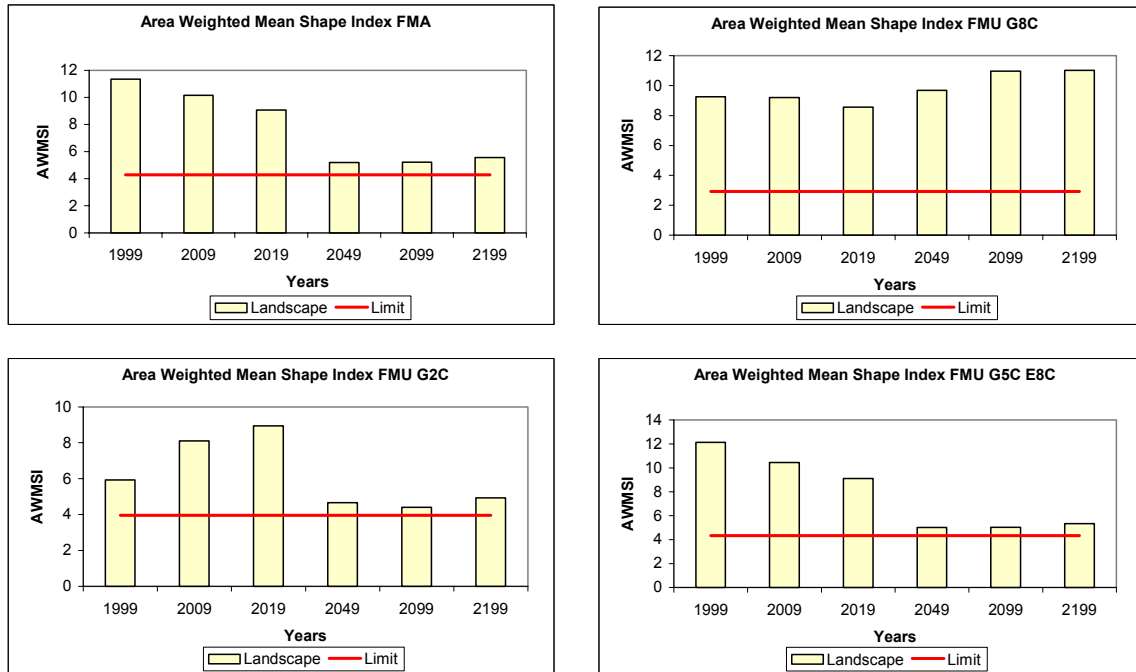


Source: ORM 2001 Analysis



Figure 141. Area-Weighted Mean Shape Index for FMA and FMUs

ORM_DFMP_Tables.xls
Figure 21



Source: ORM 2001 Analysis

Distribution of Seral Stages

Please refer to the section “Critical Element 1a, Objective 1.2b.1” for detailed discussion on the distribution of seral stages.

Distribution of Patch Sizes

Figures 135 to 138 present the distribution of patch sizes at key points in time for the FMA area and FMUs.

Except for FMU G8C, smaller patch sizes (0 - 100 ha) at both the FMA and FMU levels are greater than the historical range for the entire planning horizon. FMU G8C is within or close to the historical range for smaller patch sizes for all planning periods; however FMU G8C has a shortage of mid-size (100 - 500 ha) patches. The other FMUs have mid-size (100 - 500 ha) patch area percentages that are within or close to historical ranges. FMU G8C has almost 80% of the area in patch sizes that are greater than 500 ha, which is within the calculated historical range.

The other FMUs, on the other hand, have 500+ ha area percentages that are less than the historical range. The main reason for this is the application of a 500 ha block aggregation rule within the AAC analysis. The number of large patches will decrease over time due to the harvesting that limits the aggregated block size at 500 ha.

Canfor is committed to submitting information regarding the definitions of and spatial distribution of patches on the landscape to assist the Company and ASRD to evaluate the ecological implications of the DFMP. The Company



and ASRD will work co-operatively to review information, identify issues and determine the appropriate courses of action.

Fragmentation

Figure 139 presents the MPS at key points in time for the FMA area and FMUs.

MPS (mean patch size) at the landscape level is around 40 ha for all reported units with the exception of FMU G8C, where MPS is approximately 80 to 90 ha. This is attributed to the smaller size of this FMU with large patches of mature forest.

Connectivity

Figure 140 presents the MNND at key points in time for the FMA area and FMUs.

MNND at the landscape level is around 220 m for all reported units with the exception of FMU G8C where the MNND varies between 300 and 375 m over time. This is attributed to the smaller size of this FMU and its MPS and fragmentation as discussed in the previous section.

Patch Shape

Figure 141 presents the AWMSI at key points in time for the FMA area and FMUs.

The AWMSI (Area-Weighted Mean Shape Index) decreases from approximately 11 to 6 over time for the FMA. However, the AWMSI varies considerably between the different FMUs, with the index increasing over time in FMU G8C, variable in FMU G2C and decreasing over time in FMU G5C E8C.

◆ **Forecasting assumptions and analytical methods**

Landscape structure attributes will be monitored and reported on annually.

Distribution of Seral Stages

Please refer to the section “Critical Element 1a, Objective 1.2b.1” for detailed discussion on the distribution of seral stages.

Distribution of Patch Sizes

Analysis of the results shows that it is difficult to achieve the distribution of patch sizes as defined based on the theoretical fire-return intervals when this objective is considered secondary to other constraints in the resource and timber supply analysis. More specifically, the existing ground rules (adjacency/green-up rules) and the maximum harvest block aggregation of 500 ha (1,000 ha in the Caribou Area) will likely work against achieving the target distribution of patch sizes.

The general trend is that the proportion of mid-size (100 - 500 ha) patches increases and the proportion of large (500+ ha) patches decreases, while the proportion of small patches remains relatively stable (around 32%).

Figures 135 to 138 present the distribution of patch sizes at key points in time for the FMA area and FMUs.

Fragmentation

Fragmentation metrics quantify the degree of isolation of elements within a landscape. This aspect of landscape configuration can influence a number of ecological processes. Evidence from mathematical modelling of population dynamics and species interactions in spatially subdivided populations and from empirical studies of bird communities suggest that the dynamics of local plant and animal populations in a patch are influenced by their proximity to other sub-populations of the same or competing species (Opdam 1991, Temple 1986). As mentioned in the Indicator, MPS was selected as a measure of fragmentation. Cutblock sizes and cutblock aggregation strategies influence the MPS.

Figure 139 shows that the MPS decreases to the calculated limit over time for the FMA and always meets or exceeds the target over all time periods. The target is also met or surpassed for all FMUs.

Connectivity

Connectivity is a complementary measure of the degree to which forest patches can be considered joined together on the basis of a minimum acceptable separation distance. As mentioned in the Indicator, MNND was selected as the measure of connectivity. The extent of the landscape affects the calculation of MNND because it only considers patches within the specified search radius of the focal patch that are also within the landscape boundary. The severity of this problem can be reduced if the landscape is increased relative to the average patch size and/or the search radius is decreased. More critically, the worthiness of the MNND is limited by the definition of the search radius. A search radius that has no ecological justification will produce arbitrary results; therefore, a 400 m search radius was chosen because it is an important distance with regard to moose and caribou habitat. Moose and caribou are 2 of the main selected indicator species in the FMA area.

Figure 140 presents the MNND at key points in time for the FMA and FMUs. The MNND is below the established upper limit for the FMA at all times. However, in 2009 and 2099 the FMU G8C MNND exceeds the established upper limit. This is likely related to the relatively small size of the FMU.

Patch Shape

The complexity of patch shapes in combination with the area of the shapes can influence many ecological processes. Small mammal migration, woody plant colonization and animal foraging strategies are influenced by patch shape. Many ecological effects attributed to the complexity of shape are actually related to “edge effects”. In addition, shape influences the operability and economics of forest harvesting. For example, elongated harvest blocks require more road construction than compact blocks and thus are more costly. Patch shape is measured by shape index which is based on the perimeter-to-area ratio. Mapped cutblocks are generally simple in shape and usually somewhat rectangular. Where this is the case, the lack of measured complexity can be compensated operationally by feathering edges, variable retention and cutblock design and layout to create more edges relative to area.

The observed trend in Figure 141 suggests that landscape level shape complexity decreases over time to around 5 in the first 50 years and then remains steady at this level thereafter. However, the projected shape complexity remains above the minimum lower limit throughout the entire planning period and for all FMUs.

◆ **Forest management activities**

Future spatial planning at the landscape level will be used to make adjustments to the harvesting plans to ensure the desired level of landscape structure is maintained at key points in time.

◆ **Implementation schedule**

All new harvesting plans will follow the strategic direction as outlined in this DFMP.

◆ **Monitoring procedure**

The landscape properties will be reported as per the monitoring program defined in this DFMP. This DFMP describes the important factors relating to landscape structure and the targets.

◆ **Linkages between strategic and operational plans**

All new harvesting plans will follow the strategic direction as outlined in this DFMP.

2. Criterion

Maintenance and Enhancement of Forest Ecosystem Condition and Productivity

Forest ecosystem condition and productivity are conserved if the health, vitality, and rates of biological production are maintained.

(2a) Critical Element

Forest Health

Forest health is conserved if biotic (including anthropogenic) and abiotic disturbances and stresses maintain both ecosystem processes and ecosystem conditions within a range of natural variability.

(2a) 1. Value

Healthy forest stands

(2a) 1.1 Goal

Conserve forest health

(2a) 1.1a. Indicator

Number of occurrences and amount of area impacted by fire and catastrophic events of insects, disease, windfall, etc.

Fire has played a dominant role in the development and rejuvenation of stands within the boreal forest and foothill regions. Large fires tend to produce a more homogeneous pattern in structure, species composition and age (i.e. less biodiversity at the landscape level). However, large fires have rejuvenating qualities that play a role in ecosystem condition and productivity. The goal in fire management is to reduce the number of fires and area lost to fire, while at the same time allowing for the use of fire as a silvicultural prescription to emulate the effect of fire on the landscape.

In general, forests contain endemic levels of insects and disease that normally are not of management concern unless populations increase to epidemic (catastrophic) levels.

Catastrophic windfall events²³, resulting from a number of natural and human-related causes, can produce localized conditions that are favorable for increased levels of insects.

²³ Catastrophic windfall events refers to a windfall event that reduces the aggregated growth of the forest to such an extent that it triggers a recalculation of the Annual Allowable Cut.

For additional information regarding forest health, refer to Section F 19.

(2a) 1.1a.1 Objective

Limit the number of occurrences and amount of area impacted by fire and catastrophic events of insects, disease, windfall, etc.

◆ **Acceptable variance**

The target for occurrences is zero; however, there is an inherent level of variability built in to natural processes and the Company developed a Forest Protection Plan for managing risks.

Canfor has no control over human-caused (i.e. public), other industrial or lightning-caused fires; however, it does have control over fires caused by its operations. The acceptable variance for Company-caused fires is zero. The risks associated with the other fires are managed by assisting Alberta Sustainable Resource Development during high hazard conditions to reduce the potential area impacted.

The acceptable variance for catastrophic events of insects, disease, or windfall within the FMA area are zero.

Any fire, or other events identified in the objective, must be investigated and looked at for preventative action.

For additional information regarding Forest Protection, refer to Section F 20.

◆ **Current status**

As reported in the *Forest Protection Plan* (Canfor 2000e), there have been 178 fires in the FMA area during the last 15 years (1986-2000 inclusive), impacting a total of 187.4 ha. The average number of fire occurrences per year in the past 15 years has been 11.9, impacting an average of 12.5 ha a year. Forty-two percent (79 ha) of the burned area has been reforested. (Refer also to Section C 2.5.1).

There have been no catastrophic events of insect and disease in the FMA area since 1964.

Prior to 1997, no windfall assessment surveys were conducted within the FMA area; however, windfall was addressed operationally as found. In 1997, a windfall assessment survey was conducted in the FMA area. As a result, a number of patches (130 ha) in FMU G5C E8C in a localized area were identified as catastrophic windfall (i.e. area(s) of windfall that significantly affect the AAC). These patches were harvested in the 1998-1999 season, salvaging approximately 32,000 m³.

Based on a reconnaissance survey in FMU G2C, approximately 231 ha were harvested in 1999 in a catastrophic windfall area, salvaging approximately 39,500 m³.



◆ **Forecasting assumptions and analytical methods**

Alberta Sustainable Resource Development prepares fire weather, fire hazard and fire spread indices that assist to forecast forest protection personnel and equipment requirements.

Canfor is a participant in the North West Boreal Integrated Pest Management Working Group, which has developed an insect and disease monitoring system. Members funded a pilot project to test and improve the monitoring system and have finalized protocols for monitoring. Members of the Working Group and ASRD are working co-operatively to develop a sampling program to determine the extent of insect and disease within operating areas. The objective of the program is to locate infestations before they reach epidemic levels, and implement control activities to prevent their spread.

◆ **Forest management activities**

Current forest management practices fall under provincial pre-suppression and wildfire suppression programs as well as insect and disease monitoring and control programs (Alberta Environmental Protection 1996a). Canfor works with the provincial government to assist in the delivery of these programs. Canfor's *Forest Protection Plan* (Canfor 2000e) provides greater detail on the Company's programs for insect and disease as well as fire prevention.

To limit the occurrences of fire, the following activities occur:

- Development of a *Forest Protection Plan* including such activities as:
 - Assignment of Canfor personnel as fire duty officers each weekend during the fire season to act as the first contact for Alberta Sustainable Resource Development; and
 - Undertake infrared scanning each spring of all areas in which pile burning has occurred (within the recent winter months) in order to detect any hold-over fires and to take the appropriate action to prevent a fire outbreak.
- Provide financial aid to supplement deployment of fire protection resources; and
- Research into silviculture applications emulating fires is currently being undertaken by the EMEND Project, which is in part funded by Canfor (Canadian Forest Service 2000).

An windfall assessment scheduled for fall 2000 has been delayed to fall 2001 in order to take advantage of new technology which utilizes digital photography to identify large areas of windfall. Refer to Section F 19.3.1 for additional information regarding windfall assessments.

◆ **Implementation schedule**

The programs for monitoring and addressing fire and catastrophic events of insect, disease and windfall are currently in place.

◆ **Monitoring procedure**

The number and occurrences of fires are tracked and reported annually in the *Forest Protection Plan* (Canfor 2000e).



The *Forest Protection Plan* also includes protocols for reporting insect, disease and noxious weeds

Insect and disease outbreaks and catastrophic windfall events are monitored and appropriate action taken to reduce their spread.

◆ **Linkages between strategic and operational plans**

Fire control and prevention, and reporting of insect, disease and noxious weeds, are primarily operational functions that are described in the *Forest Protection Plan* (Canfor 2000e). Practices to address windfall are discussed within the DFMP (refer to Sections F 19.3 and F 19.3.1).



(2b) Critical Element**Ecosystem Resilience**

Ecosystem resilience is conserved if ecosystem processes and the range of ecosystem conditions allow ecosystems to persist, absorb change, and recover from disturbances.

(2b) 1. Value**Ecosystem resilience****(2b) 1.1 Goal****Sustain capability of ecosystem to recover from both natural and human-caused disturbances**

Ecosystems with a superior regenerative capacity and a varied composition of forest types (yield groups) and age classes (seral stages) are generally considered to be more resilient and thus more sustainable (CCFM 1997).

(2b) 1.1a. Indicator**The amount of area in the regenerated yield group**

Successful regeneration of harvested sites is fundamental to sustainable forest ecosystems and continued productivity. The resilience and continued presence of forested lands is dependent on maintaining regeneration standards to support sustainability. It is therefore essential to make certain that harvested sites are successfully regenerated and are as productive as they are predicted to be in this DFMP.

(2b) 1.1a.1 Objective**To regenerate 100% of the harvested area as per the regenerated yield group as defined by the DFMP**

- ◆ **Acceptable variance**

The acceptable variance is +/-10% of the area of regenerated yield groups and +/-5% of the AAC for C, CD, DC & D, provided that the overall AAC for both coniferous and deciduous are sustained (within – 5%).

- ◆ **Current status**

The 2000 Pre-harvest Ecological Assessment program, which is fundamental to the silviculture prescription program, is presently incorporating the regeneration strategy as defined in Table 57. Refer to Section F 15.3 for additional information regarding pre-harvest ecological assessments) The *2000 Silviculture Annual Operating Plan (AOP)* has incorporated the regeneration strategy for the 2000-2001 timber year cutblocks. However, the regeneration strategy is still subject to approval by Alberta Sustainable Resource Development as it forms part of this DFMP.



Table 57. Regeneration StrategyDMP_Tables.xls
Table 73a

Yield Group	Description	Natural Subregion	Regenerated Yield Group	Primary Species Years to Breast Height*	Secondary Species Years to Breast Height*	Tree Improvement Multiplier**
1	AVH(S)-AB	All	2	4	16	0.50
2	AVH(S)-CD	All	2	4	15	0.50
3	AVSW/PBSW/BASW	CMW, DMW, LFH, PRP	3	8	10	1.00
3	AVSW/PBSW/BASW	LFH, SAL	3	11	12	1.00
4	BW/BWAVH(S)	All	4	5	15	0.50
5	FB+OTH	CMW, DMW, PRP	16	8	10	1.00
5	FB+OTH	LFH, LFH, SAL	5	0	4	1.00
6	H(S)/S	CMW, DMW, LFH, PRP	17	0	10	1.00
6	H(S)/S	LFH, SAL	17	11	15	1.00
7	PB+(S)	All	7	4	10	0.50
8	PL/PLFB+(H)	CMW, DMW, LFH, PRP	8	6	10	1.07
8	PL/PLFB+(H)	LFH, SAL	8	9	12	1.00
9	PLAWAWPL	CMW, DMW, LFH, PRP	9	6	10	1.07
9	PLAWAWPL	LFH, SAL	8	9	12	1.00
10	PLSB+OTH	CMW, DMW, LFH, PRP	8	6	10	1.07
10	PLSB+OTH	LFH, SAL	8	9	12	1.00
11	PLSW/SWPL+(H)	CMW, DMW, LFH, PRP	11	7	10	1.07
11	PLSW/SWPL+(H)	LFH, SAL	8	9	12	1.00
12	SBL/TLT/SB(GMF)	All	12	15	6	1.00
13	SBL/TLT/SB(U)	All	13	23	9	1.00
14	SBPL/SBSW/SBFB	CMW, DMW, LFH, PRP	14	7	10	1.00
14	SBPL/SBSW/SBFB	LFH, SAL	14	10	12	1.00
15	SW/SWFB+(H)-AB	DMW, PRP	15	9	10	1.00
15	SW/SWFB+(H)-AB	CMW, LFH	16	9	10	1.00
15	SW/SWFB+(H)-AB	LFH, SAL	16	12	12	1.00
16	SW/SWFB+(H)-CD	CMW, DMW, LFH, PRP	16	9	10	1.00
16	SW/SWFB+(H)-CD	LFH, SAL	16	12	12	1.00
17	SWAW/SWAWPL	CMW, DMW, LFH, PRP	17	9	10	1.00
17	SWAW/SWAWPL	LFH, SAL	16	12	12	1.00

Notes on * and abbreviations:

* Includes an allowance for plantation failures; includes an allowance for regeneration delay; an entry of 0 indicates understorey protection.

** A value of less than 1.0 indicates a preference given to deciduous species; tree improvement multiplier indicates an allowance for non-treated areas.

Species: PL = Lodgepole pine; SW = White spruce; SB = Black spruce; FB = Balsam fir; LT = Tamarack larch; AVW = White aspen (Aspen); BW = White birch; H = Generic for any deciduous species (aspen, birch); S = Generic for any coniferous species (pine, spruce, etc.) OTH = includes other unidentified species when FB or PL/SB are identified as the main leading species.

Species descriptors: AB = refers to A and B stand densities (A being lower stems per ha than B); CD = refers to C and D stand densities (D being the highest stems per ha therefore the most dense type of stand); GMF = Timber productivity rating (site index) - "good, medium, fair"; U = timber productivity rating - uncommercial stand type.

Natural Subregions: CMW = Central Mixedwood; DMW = Dry Mixedwood; LFH = Lower Foothills; LFH = Upper Foothills; PRP = Peace River Parkland; SAL = Sub-Alpine

Source: Canfor 2001n

◆ **Forecasting assumptions and analytical methods**

The following are the key assumptions for the regeneration strategy, all of which have been shown in the past to be reasonably accurate:

- Early crop establishment (within 18 months) will achieve projected breast height ages within the stated times;
- Silviculture treatment(s) successfully put the harvested stand on the growth and yield trajectory of the regenerated yield group;
- Allowances for plantation failures, regeneration delay and understorey protection are accurate; and
- Tree improvement multipliers represent the actual improvement that will occur.

The *Resource and Timber Supply Analysis* has determined the current distribution of regenerated yield groups across the landscape. Seven scenarios were compared in order to understand the relationships among timber supply constraints to the timber supply and regeneration strategy (Appendix 3).



◆ **Forest management activities**

The forest management activity is to incorporate the regeneration strategy in the development of regenerated growth and yield tables that will be used in the resource and timber supply analysis.

◆ **Implementation schedule**

All regeneration strategies, plans and activities will follow the strategic direction as outlined in this DFMP. This means that harvested sites will be treated using the appropriate techniques for the particular ecosite to ensure that the regenerating stand is on the growth and yield trajectory of the regenerated yield group.

In the interim, some of the strategies developed for the plan, such as the regeneration strategy, are being implemented in anticipation of approval in order to reduce time lags in meeting DFMP objectives.

◆ **Monitoring procedure**

The regeneration strategy defined in this DFMP will be compared to planned and actual silviculture activities to ensure compliance to the acceptable variance. If results are below the acceptable variance over a 5-year period, a review of the effects of such changes on this DFMP will be evaluated. This will be reported on an annual basis in the *Annual Performance Monitoring Report* and the *Five Year Forest Stewardship Report*. (Refer to Section J 1.4)

◆ **Linkages between strategic and operational plans**

All regeneration strategies, plans and activities will follow the strategic direction as outlined in this DFMP.

(2b) 1.1b. Indicator

The amount of area in each seral stage at present and key points in time

Seral stage distribution is important for the conservation of ecosystem resilience because it provides for, over the long-term, a full range of ecosystem types and successional habitats that allow ecosystems to persist, absorb change and recover from disturbances.

(2b) 1.1b.1 Objective

Maintain seral stages within the natural disturbance regimes at present and key points in time

The target seral stage distribution is one that approximates the expected distribution created by natural disturbance regimes within the 2 Natural regions, Foothills and Boreal Forest (Figure 116). The natural disturbance regime has been modelled by using a theoretical fire-return interval.

◆ **Acceptable variance**

For this planning horizon (200 years), the acceptable variance is to be within the range of the natural disturbance regimes for seral stages in the FMA area and FMUs (G8C, G2C, G5C and E8C) as indicated in Figures 117 to 120, respectively. The acceptable variance represents a combination of both Natural regions, where they occur.

Figures 121 and 122, Foothills and Boreal Forest Natural regions, are provided only as supplementary information.

The range of natural disturbance is represented by the solid line in Figures 117 to 122, whereas the bar represents the current or projected distributions.

◆ **Current status**

The area of each seral stage by year in the FMA area, FMUs (G8C, G2C, G5C and E8C) and Natural regions (Foothills and Boreal Forest) is provided in Tables 48 to 53, respectively.

Figures 117 to 120 indicate the present and forecasted distributions for the FMA area and FMUs as compared to expected natural distributions. The observed differences are caused primarily by fire prevention and control and by anthropogenic disturbances.

◆ **Forecasting assumptions and analytical methods**

Seral stage distributions under a natural fire regime were modelled by using a theoretical fire-return interval (ORM 2000). The amount of area in each seral stage in the FMA and FMUs (G8C, G2C, G5C and E8C) has been forecasted on the landbase at each key point in time (Figures 117 to 120). The key points in time are at years 0, 10, 20, 50, 100 and 200, where 1999 represents year 0. It is assumed these time periods provide a reasonable picture of the variability of seral stage over time.

◆ **Forest management activities**

The amount of each seral stage and its distribution will be compared to the amount of seral stage expected from a theoretical fire-return interval. Adjustments will be made to the harvest schedule as required to ensure the desired seral stage distribution is obtained over time.

◆ **Implementation schedule**

Preliminary comparisons between current status and the target seral stages have been completed. All future harvesting plans will follow the strategic direction as outlined in this DFMP and be adjusted as required to meet the desired seral stages over time.

◆ **Monitoring procedure**

The amount of area of each seral stage that is on the landscape will be compared to the expected natural distributions at key points in time.

◆ **Linkages between strategic and operational plans**

All new harvesting plans will follow the strategic direction as outlined in this DFMP.

(2b) 1.1c. Indicator

Timeframe for treating harvested areas

Maintaining the health and productivity of forest ecosystems are vital components to responsible stewardship and sustainable development of forested lands. It is important that harvested stands be treated properly and promptly in order to maintain the resilience and long-term use of forested land. Prompt treatment will also reduce the lag time between harvest and successful

regeneration, which will restore overall ecosystem productivity and resilience more rapidly.

(2b) 1.1c.1 Objective

All harvested sites are treated within 18 months after the end of the timber year

- ◆ **Acceptable variance**

A variance of +3 months is acceptable in order to accommodate the occurrence of fire and periods of extreme weather conditions, including floods and drought. These natural events could delay the treatment of harvested areas.

- ◆ **Current status**

Section 141.1(1) of the *Timber Management Regulation* (Alberta Regulation 60-73) states that reforestation in a cutblock must occur within 2 years after the end of the year of the cut. All harvested areas in the FMA area are properly treated within 18 months after the end of the timber year as of 1996 (Canfor 2000h), thereby exceeding the Alberta Provincial Regulations pertaining to reforestation.

- ◆ **Forecasting assumptions and analytical methods**

No forecasting or analysis is required.

- ◆ **Forest management activities**

Pre-harvest silviculture prescriptions (PHSP) will be assigned to all proposed harvested areas in order to plan silviculture activities in a timely manner to meet the stated objective (refer to “Critical Element 6f, Objective 1.1a.2”).

- ◆ **Implementation schedule**

It is currently implemented as of the 1996 timber year.

- ◆ **Monitoring procedure**

All harvested sites will be monitored to ensure that site treatment occurs within 18 months from the end of the timber year in which the block was harvested. Silvicultural records are maintained.

- ◆ **Linkages between strategic and operational plans**

All site treatment strategies will follow the strategic direction as outlined in this DFMP.

(2b) 1.1d. Indicator

Soil productivity

As stated in the *CSA Matrix* (Appendix 7), soil productivity is covered in “Critical Element 3b, Goal 1.1” with 3 indicators and 3 objectives. Soil productivity is a Value in 3b, but the FMAC also viewed soil productivity as an indicator for “Critical Element 2b, Goal 1.1”. Therefore, the write up for “Critical Element 3b, Goal 1.1” applies to this section as well.

(2c) Critical Element**Ecosystem Productivity**

Ecosystem productivity is conserved if ecosystem conditions are capable of supporting all naturally occurring species.

(2c) 1. Value**Ecosystem productivity****(2c) 1.1 Goal****Maintain ecosystem productivity****(2c) 1.1a. Indicator****Level of suitable habitat for selected indicator species**

Consultation with members from the Forest Management Advisory Committee (FMAC), the Forest Ecosystem Management Task Force and Canfor resulted in the selection of the following 7 selected indicator species: moose (*Alces alces*), American marten (*Martes americana*), pileated woodpecker (*Dryocopus pileatus*), barred owl (*Strix varia*), woodland caribou (*Rangifer tarandus caribou*), bull trout (*Salvelinus confluentus*) and trumpeter swan (*Cygnus buccinator*). Out of this group, the first 4 were selected for HSI modelling and the last 3 are to be managed by means of habitat constraint modelling. (Refer to Section F 5.3 for additional information regarding selected indicator species).

These 7 species were selected because they represent a broad and variable range of habitat characteristics. Thus, if the habitat is maintained and available for these species, it is assumed that the FMA area will contain a wide range of habitat conditions suitable for many other species in the planning area.

(2c) 1.1a.1 Objective**Maintain habitat conditions required by identified selected indicator species utilizing HSI models**

The techniques used to evaluate the suitability of habitat for specific species are called habitat suitability index (HSI) models. They are able to predict the value of a habitat to a specific species, based on life variables related to food, availability of cover and the physical size of the potential habitat. An HSI value of 0 indicates the non-habitat and a value of 1 indicates the optimum habitat. HSI can be categorized into a scale of habitat quality as nil, low, medium and high. The results from the HSI models are presented in Figures 127, 128, 129 and 130.

HSI and carrying capacity models are only surrogate measures of both present and estimated suitable habitat and populations over time. The models are only for monitoring the effect of the timber management plan on these species.

The HSI and carrying capacity model results help determine which variables in aggregate compose a specific species' habitat. If the HSI model is predicted to

have a large percentage of low or nil area or a carrying capacity is below the acceptable variance, then the variable or variables causing a low prediction should be isolated and analysed. It may be determined that the data collected does not adequately represent the variable used in the habitat prediction model; therefore, the sampling strategy should be re-evaluated. Alternatively, once the variable of concern is determined, operational activities or strategic plans that negatively impact the variable of concern should be adjusted as part of an adaptive management plan to ameliorate the situation.

Carrying capacity, the potential number of animals that would occur in a perfect unit of habitat (HSI = 1.0), can be estimated by multiplying the predicted number of animals by the total available habitat (De La Mare 1998).

◆ **Acceptable variance**

The acceptable variance for the 4 selected species is to maintain the carrying capacity within -10% of the current status at key points in time (0, 10, 20, 50, 100 and 200 years).

The solid line in Figures 123, 124, 125 and 126 represents the acceptable variance for all 4 selected species. The bars represent the current and projected carrying capacities.

◆ **Current status**

The current status for the 4 selected indicator species are as follows:

- Moose: Figure 123 displays the carrying capacity for moose on an FMA and FMU level. The carrying capacity exceeds the acceptable variance on an FMA level and for all FMUs for the entire planning horizon.
- American marten: Figure 124 shows the carrying capacity for marten on an FMA and FMU level. The carrying capacity exceeds or meets the acceptable variance for the entire planning horizon on all FMUs and the entire FMA area.
- Pileated woodpecker: Figure 125 displays the carrying capacity for pileated woodpecker. For FMU G8C the carrying capacity is above the acceptable variance for all years in the planning horizon. For the FMA area and FMUs G2C and G5C and E8C, carrying capacity drops just below the variance at the end of the planning horizon. This decline is primarily due to the decrease in the amount of area with optimal value (HSI = 1) for the variable representing snags and stubs greater than 16cm DBH per ha. Current data suggest the decline follows the decline in area of mature stands. However, there are gaps in the data estimates of snags and stubs greater than 16 cm DBH across all seral stages for all 17 yield groups.
- Barred owl: Figure 126 shows the carrying capacity for barred owl. On the FMA level and for FMU G8C the carrying capacity meets or exceeds the acceptable variance for the entire planning horizon. For FMU G2C and FMU G5C and E8C the carrying capacity drops just below the variance in specific points in time. According to Olsen et al. (1995) the stand characteristic most important to habitat selection for the barred owl is the presence of suitable nest trees. Research by Takats (1997) has shown

that the most suitable nest sites exist in balsam poplar trees of DBH greater than 60 cm. Given the present age and distribution of balsam poplar in the forest, there is limited availability of suitable trees for barred owl.

◆ **Forecasting assumptions and analytical methods**

The assumptions of the HSI models themselves are described in Beck *et al* (1996), De La Mare (1998) and Takats (1997) The key assumptions of the HSI models being used are:

- A larger area of poorer habitat is equivalent to a smaller area of higher quality habitat;
- The quantity and quality of habitat can be used to estimate the maximum potential number of animals that it is able to support; and
- The data available to drive the model is representative of the actual conditions.

◆ **Forest management activities**

In order to apply the HSI models, the relationship between important habitat characteristics and stand variables was evaluated and habitat values determined for each 20-year breast height age class for each yield group (Canfor 1999c). The habitat models have been applied to the landscape at key points in time (0, 10, 20, 50, 100 and 200 years) to determine the amount of potential habitat available (carrying capacity) for the selected species.

The change in carrying capacity over time for moose, American marten and pileated woodpecker is demonstrated in Figures 123, 124, 125 and 126. The data is shown for the entire FMA area and by FMUs (G8C, G2C, G5C and E8C).

These results must be interpreted as modelled estimates of future conditions and are used for monitoring and changing operational and strategic practices within an adaptive management plan. Decreases in carrying capacity may be caused by physical changes within the FMA area, or they may be a result of measurement and analysis limitations given the complexity of habitat modelling.

Further evaluation of carrying capacities that fall below the acceptable variance will be conducted. If the predicted drop is related to management activities, operational and strategic plans will be adjusted to ameliorate any negative impact. Canfor's Permanent Sample Plot program will help understand the dynamics of snags and stubs and it will also provide data to fill in the gaps currently present in the modelling data set.

Canfor will work closely with the Alberta Sustainable Resource Development, Land and Forest Division (LFD) and Natural Resources Service (NRS) and the Forest Management Advisory Committee (FMAC) to avoid management practices that place selected indicator species at risk (Canfor 1997).

For the future, Canfor is also working on models that utilize an HSI type approach to evaluate wildlife habitat at the landscape level (1:100,000 scale). These models represent a variety of indicator wildlife species grouped into



guilds (Canfor 1998b) and will then be applied at key points in time. If potential problems are identified, information from this new landscape level habitat evaluation project will provide insight into the development of preventative and mitigative strategies.

◆ **Implementation schedule**

The HSI models are reported in this DFMP.

The new landscape level habitat evaluation project (Canfor 1998b) has been rescheduled for completion by the end of September 2001; however, validation and testing of the model results and development of operational strategies will be completed by May 2003.

◆ **Monitoring procedure**

Harvesting activities will be monitored (as per the forest management activity above) to ensure that they follow the management strategies defined in this DFMP.

◆ **Linkages between strategic and operational plans**

All new harvesting plans will follow the strategic direction as outlined in this DFMP.

(2c) 1.1a.2 Objective

Maintain habitat conditions required by identified selected indicator species, using habitat constraint modelling

◆ **Acceptable variance**

Woodland Caribou

The target for woodland caribou is to have no more than 20% of the area in pioneer or young seral condition. At least 20% of the area must be in old seral condition (Table 16). The acceptable variance for the pioneer/young seral condition is no more than 25% of the area. The acceptable variance for the old seral condition is to be no less than 15% of the area.

Trumpeter Swan

Zero variance with respect to harvesting within the “no harvest” buffers unless approved by Alberta Sustainable Resource Development.

◆ **Current status**

Woodland Caribou

There are 2 woodland caribou herds within and adjacent to the FMA area: A La Peche and the Little Smoky (Figure 131). Their total range is 466,127 ha with 70,228 ha located within the FMA area is (representing 15% of the total area and 10.8% of the total FMA area of 649,160 ha).

Table 16 represents the current status (1999) and projected status for pioneer/young and old seral stage distribution.

Bull Trout

The total bull trout area identified within the FMA area is 242,828 ha as indicated in Figure 132. This represents 37% of the total FMA area.

The H60 line has been determined for all watersheds aggregated up to a minimum of 500 ha in the bull trout area (Figure 133). There are a total of 163

watersheds in the bull trout area. More detailed description of the data is in Appendix 12 Tables 1 - 4. A summary of watersheds above the ECA of 35% flagged for concern is presented in Table 19. For further information regarding the flagging (concern areas), refer to the section on *Forecasting assumptions and analytical methods* below.

Trumpeter Swan

There are 45 areas that have been identified by Alberta Sustainable Resource Development, Natural Resource Services (NRS) which have been buffered to protect nesting sites in the FMA area (Figure 134).

◆ **Forecasting assumptions and analytical methods**

Woodland Caribou

The constraints, defined under the forest management activities, used in the *Resource and Timber Supply Analysis* modelling will ensure habitat conditions for woodland caribou are not adversely impacted by Canfor's operations.

Bull Trout

It is assumed that streamflow maxima will not adversely impact the ecosystem if no more than 20-40% of the total vegetated cover is removed within the area above the H60 within a defined watershed.

The following will be used to evaluate potential watersheds that may require further adjustments:

- A base 0 (Equivalent Clearcut Area value) has been calculated (Appendix 12 Table 1) which includes the 1999 Annual Operating Plan proposed areas as part of the harvested areas. The need to do this is to demonstrate present ECA values that will not change;
- The ECA percentage report (Appendix 12 Tables 2 and 3) for year 10 (2009) and year 20 (2019) was based on the resource and timber supply analysis;
- The following criteria will be used to flag areas of concern:
 - ECA >35% in bull trout area; and
 - Visual representation.

For a more detailed discussion regarding ECAs and H60, see "Critical Element 3c, Objective 2.1a.1" or "Critical Element 4a, Objective 1.2a.1". Also refer to Section F 4.1.1.

Trumpeter Swan

Buffer areas will be maintained, unless changes are recommended or approved by the Alberta Sustainable Resource Development, Land and Forest Division (LFD).

◆ **Forest management activities**

Woodland Caribou

Cover constraints are being applied to forested stands identified within the Caribou Area (Figure 131) as follows:

- No more than 20% of the area can be in pioneer or young seral condition;



- No less than 20% of the area can in old seral stage;
- Maximum opening size of 1,000 ha; and
- 30 year green-up.

In addition, Canfor, as a member of the West Central Alberta Caribou Standing Committee (WCACSC), is participating in a 3 to 5 year research program, which began in April 1998 (Rohner and Schmigelow 1999). There are 3 components of this program:

- Predation;
- Forest renewal; and
- Responses to human infrastructure.

Bull Trout

Bull trout habitat is dependent on the amount of vegetated cover within a watershed. Vegetated cover removal must be controlled to maintain adequate habitat. The absolute amount of Equivalent Clearcut Area (ECA) that can be supported without adverse impacts to bull trout is not well understood; it differs depending upon watershed sensitivity. Given this lack of understanding, it is important to monitor the amount of ECAs.

Trumpeter Swan

Two hundred meters of “no harvest” buffers are maintained around identified trumpeter swan areas to protect nesting sites, unless changes are recommended or approved by the LFD.

◆ **Implementation schedule**

Woodland Caribou

The cover constraints are currently being implemented in the Annual Operating Plan (AOP).

Bull Trout

ECA values have been calculated and data utilized in the 2001 AOP.

Trumpeter Swan

Protection of identified nesting sites has been implemented and will be maintained.

◆ **Monitoring procedure**

Woodland Caribou

- Canfor will monitor the DFMP cover constraints as stated in the Forest Management activities; and
- The status of the WCACSC research program will be monitored. Data coming from this research program will be used to enhance forest management within the Caribou Area (Figure 131).

Bull Trout

The Equivalent Clearcut Area (ECA) within the defined watersheds will be tracked.

Trumpeter Swan

Verify the presence of nest sites as identified in the active AOP planning areas and incorporate any new nest sites into future plans.

- ◆ **Linkages between strategic and operational plans**

All new harvesting plans will follow the strategic direction as outlined in this DFMP.

(2c) 1.1b. Indicator**Number of ecosite phases distributed across the FMA area**

Ecosite phases are based either on canopy species composition or the tallest vegetation layer in the absence of a tree canopy. Ecosite phases are similar to the defined yield groups. However, ecosite phases represent substantially more ecological information relating to productivity and ecosystem health than yield group alone.

Ecosite phases are subdivisions of ecosites, which are ecological units that develop under similar environmental influences (climate, moisture and nutrient regimes) (Canfor 2001a). They are functional units that have a characteristic range in plant communities.

The tree canopy and canopy-dependent factors, including understorey species abundance and composition and litter pH, act together to influence the type and quantity of organic matter, rates of decomposition and a site's nutrient availability (Canfor 2001a). Thus, identifying ecosite phases and understanding their distribution provides a wealth of ecological knowledge, summarized as comprehensively mapped units. Ecosite phases provide information for evaluating and maintaining the productivity of natural ecosystems.

(2c) 1.1b.1 Objective**Identify ecosite phase distribution objectives for application in the next DFMP**

- ◆ **Acceptable variance**

Not applicable until the research program is completed.

- ◆ **Current status**

The ecosite classification system was recently revised (Canfor 2001a) to include certain specific ecosites, ecosite phases and plant community types that were not defined in the original field guides (Beckingham *et al* 1996a; Beckingham and Archibald 1996). This revision is currently being used for the 2000 Pre-harvest Ecological Assessment program. Refer to Section F 14.3 for additional information regarding Pre-harvest Ecological Assessments.

Information collected from this field program revision as well as data from other programs such as PSP and NIVMA plots is currently being analyzed for quality and integrity as inputs into the revised, predictive ecosite classification model. Refer to Section J 1.2 for additional information regarding PSP and Section F 16.1.8 for NIVMA plots.

◆ **Forecasting assumptions and analytical methods**

The modelling system employed for mapping the ecosite phases uses a variety of ecological data: AVI, ecological plot data, LFD ecological plot data, ecosection classification, digital elevation models (DEM) and DEM derived data (e.g., slope, aspect), statistical techniques and expert knowledge to identify and classify ecosites and ecosite phases. The methodology and assumptions are explained in the final report - Ecosection and Ecosite Evaluation and Mapping (Canfor 2001a).

◆ **Forest management activities**

A strategy will be developed, which uses ecosite classification and ecosite phases in the strategic and operational planning.

◆ **Implementation schedule**

There are 2 components to be completed:

- Completion of the ecosite phase report and map by March 31, 2001; and
- Linkages of ecosite classification and ecosite phases will define strategic direction for the future DFMP and operational planning by 2005.

◆ **Monitoring procedure**

Monitoring will be undertaken of the quality and integrity of ecosite classification data being collected for various programs such as pre-harvest silviculture prescription, NIVMA and PSP plots. The data from these programs will be used to validate and improve the predictive ecosite classification model.

◆ **Linkages between strategic and operational plans**

The revised ecosite classification will be used for silviculture prescriptions to meet the regeneration objectives, defined in this DFMP.

(2c) 1.1c. Indicator

Measurement of tree growth (site index) based on yield curves (moisture and nutrient regime)

Site index is a common measure of the overall productivity of forested ecosystems (inferred through tree growth). Site index is commonly referred to as the predicted height for a specific tree species at a given breast height age (Beckingham *et al* 1996).

The measurement of tree growth is directly related to the productivity of the site. Consequently, tree growth is a general indication of the overall site productivity.

(2c) 1.1c.1 Objective

Maintain growth and yield projections for tree species, as stated in the DFMP

◆ **Acceptable variance**

A decrease of no more than 5% from the growth and yield projections, as outlined in this DFMP, will be considered acceptable. Measured growth or yield above the projected values is acceptable.

◆ **Current status**

Yield curves, which predict the growth (height) of a particular tree species over time, have been developed for the FMA area for each tree species within each Natural subregion (Canfor 1998a).

Yield tables, projecting the site height, volume (m³/ha), periodic annual increment (PAI) and mean annual increment (MAI), have been developed for the dominant softwood and hardwood species for each yield group in each Natural subregion (Canfor 1999e).

◆ **Forecasting assumptions and analytical methods**

The forecasting assumptions and analytical methods pertaining to the maintenance of growth and yield projections for tree species is outlined in the *Growth and Yield Information Package, Detailed Forest Management Plan 1999* (Canfor 1999h). The following are the key assumptions for the regeneration strategy:

- Projected breast height ages will be achieved within the stated times;
- Silviculture treatment(s) successfully put the harvested stand on the growth and yield trajectory of the regenerated yield group;
- Allowances for plantation failures, regeneration delay and understorey protection are accurate; and
- Tree improvement multipliers represent the actual improvement that will occur.

Site index values were calculated using temporary and permanent sample plot data (TSP and PSP, respectively) (Canfor 1999f). The site index models were subsequently evaluated using PSP data to ensure that the models accurately predict growth and yield values. Statistical and graphical validation of actual PSP height growth trajectories versus tree-based height growth was carried out to evaluate the models.

The yield tables were developed from models that used the TSP data collected in 1997. Similar to the site index models, the volume-height models used to develop yield (volume) projections were validated using PSP data (Canfor 1999g). This validation was performed to confirm whether the volume-height models provide an acceptable estimation of actual values.

◆ **Forest management activities**

Operational (silviculture) plans will be developed in order to achieve the growth and yield projections, as outlined in this DFMP.

◆ **Implementation schedule**

Growth and yield projections and site index curve development have been completed. The implementation strategy is outlined in this DFMP.

◆ **Monitoring procedure**

Canfor's PSPs, modified silviculture surveys and other growth and yield programs will be used to evaluate the growth and yield projections in non-harvested and regenerating stands. The data will be collected and analyzed within a regular schedule.

Four basic components of growth and yield will be monitored:

- Validation of growth and yield forecasts:
 - The growth and yield models will be validated to ensure that the predicted values are within the range of observed values.
 - Performance standards will be monitored:
 - Canfor is developing objective-driven performance standards that reflect the objectives of this DFMP (ORM 2001b);
 - Early establishment (within 18 months);
 - Silviculture prescription described in the Silviculture AOP; and
 - Predicted heights and stocking proportions are achieved at predicted ages.
 - Compliance monitoring:
 - Planned activities will be monitored to ensure they are implemented as stated in this DFMP.
 - Long-term monitoring:
 - Growth and yield will be monitored, via PSPs, to ensure predicted values are realized over the long-term.
- ◆ **Linkages between strategic and operational plans**
All silviculture prescriptions will follow the strategic direction outlined in this DFMP.



3. Criterion

Conservation of Soil and Water Resources

Soil and water resources and physical environments are conserved if the quantity and quality of soil and water within forest ecosystems are maintained

(3a) Critical Element

Physical Environments

Physical environments are conserved if the permanent loss of forest area to other uses or factors is minimized, and if rare physical environments are protected.

(3a) 1. Value

Gross landbase

(3a) 1.1 Goal

Minimize loss of landbase

Roads, wellsites, powerlines, pipelines, recreational sites, campsites and gravel pits are all examples of dispositions that are withdrawn from the landbase by either the forest industry or the energy sector. Many are withdrawn for about 10 to 20 years; therefore, they are considered permanent. Once they are no longer required, they are reclaimed and added back into the FMA area.

(3a) 1.1a. Indicator

The amount of productive area Canfor utilizes for future permanent roads (LOC)

Permanent roads are those roads that are managed through the License of Occupation (LOC) disposition process. All permanent roads have been excluded from the landbase in the net-down process (Canfor 2000) using all of the following methods:

- AVI standards version 2.1 (Alberta Environmental Protection 1991);
- Additional roads buffered utilizing GIS methodology; and
- A 2% reduction on all yield tables (to allow for future roads).

(3a) 1.1a.1 Objective

To have less than 2% of productive area in Canfor's future permanent roads (LOC)

The total timber harvesting (productive) landbase of the FMA area is 474,193 ha and the acceptable amount of new permanent roads is less than 2% of the productive landbase (9,483 ha).



◆ **Acceptable variance**

The acceptable variance is zero.

◆ **Current status**

The existing permanent roads in the FMA area do not contribute to the forested landbase. Consequently, they have been part of the net-down for the annual allowable cut (AAC). Only main haul roads are constructed for permanent access and these are managed through the License of Occupation (LOC) disposition process.

The total timber harvesting (productive) landbase of the FMA area is 474,193 ha, the acceptable limit of new permanent roads would therefore, be 9,484 ha. Since 1999, Canfor has constructed or acquired 3 LOCs (equating to 16.22 ha) as follows:

- LOC 930682A (2.5 km) extension was constructed in the Deep Valley operating subunit DN-3;
- LOC 961570 (1.8 km) was acquired from an oil company in operating subunit SIM-3; and
- LOC 003218 (7.0 km) was constructed in operating subunit DN-5. (acquired from Burlington Resources Ltd.).

Refer to Appendix 3 for additional information regarding operating units and subunits.

◆ **Forecasting assumptions and analytical methods**

Not applicable.

◆ **Forest management activities**

All Canfor's future permanent roads will be managed to ensure utility for all parties (integration) and to promote common corridors with other industrial activities where possible. Thus, all parties must effectively communicate their road building and construction plans. Refer to Section F 12.5 for additional information regarding shared access and Section F 12.5.1 for communication plans.

◆ **Implementation schedule**

All LOCs constructed as of May 1, 1999 are tracked.

◆ **Monitoring procedure**

Canfor will monitor its performance in achieving the objective by tracking the actual and projected amount of Canfor's future permanent roads to be constructed. All newly constructed permanent roads and those permanent roads proposed in the AOP/5 year GDP will be reported in the *Annual Performance Monitoring Report*.

◆ **Linkages between strategic and operational plans**

This objective has been communicated to operational staff to minimize the amount of permanent road construction.



(3a) 1.1b. Indicator

The amount of area permanently lost to other industry activities

All permanent dispositions built as of May 1, 1999 have been excluded from the landbase using AVI standards version 2.1 (Alberta Environmental Protection 1991).

There are no deductions made in the annual allowable cut (AAC) for future oil and gas permanent withdrawals because the oil and gas industry compensates the forest industry by paying timber damages. Timber damage assessments (TDA) are calculated for all withdrawals from the landbase, based on area and stand type. The timber damage monies collected are used to offset and replace the AAC. Refer to Section F 12.3 for additional information regarding TDA.

Salvaged wood is not AAC chargeable because compensation is received as described above, therefore, it is important that all accessible salvaged wood is utilized.

Seismic lines are not considered a permanent deduction. Therefore, Canfor has taken a net-down on the yield tables of 1% (Canfor 2000).

These permanent withdrawals take many years to become part of the productive forestlands again. Working co-operatively with the other industries is important in maintaining the productive landbase.

(3a) 1.1b.1 Objective

To minimize loss of area by working with other parties

The rate at which these current and future landbase withdrawals revegetate to commercial tree species will affect the long-term sustainability of current harvest levels for the forest industry (Stelfox and Wynes 1999). The key means of minimizing loss of area is to communicate plans with other industries and integrate these plans where feasible. These activities will also assist in meeting "Critical Element 4c, Objective 1.3a.1".

◆ **Acceptable variance**

Canfor has no direct control over the amount of other industry activity that occurs in the FMA area; the Company can only monitor trends and communicate with other companies on an informal basis.

The data listed in Table 58 will be monitored and if the variance in area withdrawn (excluding seismic) exceeds 10% of the highest value in the past 5 years, then a concern around the amount of other industrial activity will be raised with Alberta Sustainable Resource Development and action will be considered to try to reduce the area impacted.



Table 58. Summary of Landbase Withdrawals (1994-2000)DMP_Tables.xls
Table 12

Period Ending Dec. 31	Number of Dispositions	Area Withdrawn (no seismic) (ha)	Area of Seismic (number of programs) (ha)	Total Area (ha)
1994	178	689	223 (15)	912
1995	173	501	676 (34)	1,177
1996	230	588	212 (55)	800
1997	246	649	227 (32)	876
1998	205	689	242 (26)	931
1999	151	337	170 (21)	507
2000	221	619	96 (25)	715

Source: a compilation of Canfor data

◆ **Current status**

The average amount of area withdrawn on an annual basis is approximately 582 ha, as indicated in Table 58.

Canfor's 5 year *General Development Plan* (GDP) map is forwarded to the main industry companies (oil/gas and timber) operating in the FMA area, along with an information letter explaining the Company's desire for sharing of access and communicating long-term plans. These companies are recorded in a stakeholder database for ease of reference.

◆ **Forecasting assumptions and analytical methods**

Not applicable.

◆ **Forest management activities**

Since 1997, an information letter and access map (5 year GDP map) has been sent, on an annual basis, to the main industry companies.

An improved communication strategy will be developed and this strategy will be conveyed to the main industries regarding opportunities for reducing area lost due to linear disturbances and other dispositions, such as:

- Recommending the development of a communication plan with other industry input;
- Sharing access routes both in the short-term and long-term;
- Determining where new roads (permanent or temporary) may have to go to support several activities;
- Locating new roads to take advantage of existing permanent linear disturbances; and
- Utilizing abandoned clearings for campsites.

◆ **Implementation schedule**

The improved communication strategy, as stated above, will be developed by December 2001.



◆ **Monitoring procedure**

The amount of area withdrawn on an annual basis, as shown in Table 58, is tracked in the landuse database. In addition, the key components of the communication plan will be tracked to ensure that they are followed.

Area withdrawn for other industrial activities has a direct effect on many of the management objectives. Other industrial activities will be monitored through linear disturbance updates every 5 years to determine if any large effects upon the DFMP objectives have occurred (i.e. effect upon seral stages and HSIs).

◆ **Linkages between strategic and operational plans**

Industrial plans are reviewed and their impact upon operational plans assessed.

(3a) 2. Value

Rare physical environments (presence of)

(3a) 2.1 Goal

Protect the natural states and processes of the rare physical environments

(3a) 2.1a. Indicator

The amount of area of lands excluded from harvest, in the DFMP

The areas protected from harvest (Figure 115) are the Parabolic Sand Dunes (contained in the FMU G5C E8) and Cactus Hills, Peace Parkland and Peace River Dunvegan (contained in the Peace Block). These areas, also known as rare physical environments, have been excluded from the landbase in the net-down process before the calculation of annual allowable cut (AAC) for this DFMP (Table 4).

(3a) 2.1a.1 Objective

One hundred percent (100%) of identified and validated rare physical environments will not be harvested

◆ **Acceptable variance**

The acceptable level of variance is zero because 100% of the identified and validated rare physical environments will not be harvested.

◆ **Current status**

The areas that have been identified as rare physical environments were not included in the calculation of AAC and will not be harvested.

On December 20, 2000, the Cactus Hills, Peace Parkland and Peace River Dunvegan areas received official designation as a special place as part of the Dunvegan West Wildland. The Dunvegan West Wildland, which comprises

20,968 ha, contains 4,471.1 ha within the FMA area and 16,4976.9 ha outside the FMA area. Notable features of the Wildland include hoodoo landscapes, exposed grassy slopes, fossil beds and habitat for geese, moose, elk, deer and birds of prey. Alberta Sustainable Resource Development is in the process of withdrawing the Wildland from the FMA area

- ◆ **Forecasting assumptions and analytical methods**
These rare physical environments, although not harvested, contribute to other ecological values on the landbase (e.g. seral stages).
- ◆ **Forest management activities**
There are no harvesting activities for these rare physical environments. There are Permanent Sample Plots (PSP) located in some of the rare physical environments. These plots will continue to be measured in the future.
- ◆ **Implementation schedule**
Maintain current status.
- ◆ **Monitoring procedure**
Ensure no harvesting occurs in these rare physical environments. These areas will be evaluated in the future as to their importance to the ecological attributes of the FMA area. New rare physical environments will be reviewed and considered in the future. The impact of any changes in the rare physical environments will be evaluated.
- ◆ **Linkages between strategic and operational plans**
Harvest restrictions for the rare physical environments are identified in this DFMP and incorporated into the operational plans.

(3a) 2.1a.2 Objective

No active reforestation of grasslands

Grasslands are not included in the *Resource and Timber Supply Analysis*; however they are of ecological importance. Grasslands are defined in the AVI standards version 2.1 as areas that have less than 6% canopy cover and are non-forest vegetated land = "HG" greater than 4 ha in size.

- ◆ **Acceptable variance**
Less than 0.5 ha of grasslands adjacent to a harvested area being reforested (based on the database query) will be considered acceptable.
- ◆ **Current status**
The FMA area currently contains 4,654 ha of grasslands (0.72% of gross landbase). The AVI database tracks the stand types that have been harvested and reforested. A query of a shape file, grass_aop database, revealed that in 1999 a negligible amount of 0.21 ha of grassland (that was originally classified as over 4 ha) was reforested (representing 4 harvested areas) and in 1998 a total of 1.7 ha (representing 5 harvested areas) was reforested. It should be recognized that the areas above have not been field verified and may be a result of the inherent variability of AVI typing. Therefore, it can be said that there has been no active reforestation of any grasslands within the FMA area.

- ◆ **Forecasting assumptions and analytical methods**
The grassland areas are defined by the AVI standard version 2.1 and will be maintained as grasslands on the landbase.
- ◆ **Forest management activities**
No reforestation of grasslands will be conducted.
- ◆ **Implementation schedule**
Current practice.
- ◆ **Monitoring procedure**
Ensure no reforestation occurs. When grasslands occur adjacent to or within proposed harvest areas, the status of the grassland (greater than 4 ha) will be confirmed. This information will be used to update the base information.
- ◆ **Linkages between strategic and operational plans**
The reforestation restrictions for grasslands are discussed in this DFMP and applied in operational plans.

(3a) 2.1a.3 Objective

Protect 100% of identified significant wildlife mineral licks

- ◆ **Acceptable variance**
The acceptable variance is zero.
- ◆ **Current status**
Currently, there are approximately 159 wildlife mineral licks protected within the FMA area, representing an area of 480 ha (0.07% of the entire FMA area).

Significant wildlife mineral licks are identified operationally during pre-harvest assessments and block layout. Licks are protected with a 100 m “no harvest” buffer.
- ◆ **Forecasting assumptions and analytical methods**
No forecasting or analysis is required.
- ◆ **Forest management activities**
Management activities include identification, verification and buffering of significant wildlife mineral licks. New field staff will require training in the identification of wildlife mineral licks.
- ◆ **Implementation schedule**
Protecting wildlife mineral licks is part of Canfor’s current practice. Starting in May 2001, a monitoring procedure will be implemented to verify that the objective is being met.
- ◆ **Monitoring procedure**
After May 2001, a minimum of 10% of newly identified wildlife mineral licks will be randomly sampled (annually) to verify that the objective is met.
- ◆ **Linkages between strategic and operational plans**
The management practice of identifying, verifying and buffering significant wildlife mineral licks is part of Canfor’s Environmental Management System (EMS).



(3a) 2.2 Goal
Identify areas to nominate for the Special Places Program

(3a) 2.2a. Indicator
Cactus Hills (84-9-W6M) and Peace Parkland (81-7-W6M)

The Cactus Hills and Peace Parkland (also known as Fourth Creek) will be nominated as special places under the Alberta Special Places Program. The Special Places Program aims to complete a network of protected areas to preserve the environmental diversity of the province's 6 Natural regions and 20 subregions. The program balances the preservation of Alberta's natural heritage with 3 other cornerstone goals: heritage appreciation, outdoor recreation and tourism/economic development.

(3a) 2.2a.1 Objective
Nominate Cactus Hills and Peace Parkland areas as candidate sites for the Alberta Special Places Program

- ◆ **Acceptable variance**
These areas have already been nominated.
- ◆ **Current status**
Canfor and the Dunvegan West Local Committee have nominated the Cactus Hills, Peace Parkland and the Peace River Dunvegan area under the Alberta Special Places Program. On December 20, 2000, these areas received official designation as a special place as part of the Dunvegan West Wildland. Table 25 shows the area of the Dunvegan West Wildland that occurs within Canfor's FMA area.
- ◆ **Forecasting assumptions and analytical methods**
These designated areas will be maintained as "no harvest" areas.
- ◆ **Forest management activities**
There are no harvesting activities for these designated sites.
- ◆ **Implementation schedule**
Maintain current status.
- ◆ **Monitoring procedure**
The objective has been achieved as of December 20, 2000.
- ◆ **Linkages between strategic and operational plans**
The final boundaries will be incorporated into the future planning process.

(3a) 2.3 Goal

Maintain a combination of managed and rare physical environments on the forest landbase

Rare physical environments (Figure 115) are those areas protected from harvest: Parabolic Sand Dunes (Main Block) and Cactus Hills, Peace Parkland and Peace River Dunvegan (Peace Block). All other areas outside of the rare physical environment, within the FMA area, are deemed to be managed.

(3a) 2.3a. Indicator

The amount of area in managed forests and rare physical environments

Forests have a range of timber and non-timber values. Canfor recognizes there are some rare physical environments that can contribute other ecological values and, therefore, will be protected from harvest.

(3a) 2.3a.1 Objective

A combination of managed and rare physical environments will always be maintained on the landbase

There is a need to ensure rare physical environments (identified) exist in the FMA area.

- ◆ **Acceptable variance**
The acceptable variance is zero.
- ◆ **Current status**
Within the FMA area, 10,585 ha are designated as rare physical environments.
- ◆ **Forecasting assumptions and analytical methods**
The area of rare physical environments will be maintained.
- ◆ **Forest management activities**
No forest harvesting activities will occur in the rare physical environments; however, they contribute to other ecological values.
- ◆ **Implementation schedule**
There is currently a combination of areas protected from harvest (rare physical environments) and managed areas in the FMA area.
- ◆ **Monitoring procedure**
Ensure no harvesting occurs in these rare physical environments. These areas will be evaluated in the future as to their importance to the ecological attributes of the FMA area. New rare physical environments will be reviewed and considered in the future. The impact of any changes in the rare physical environments will be evaluated.
- ◆ **Linkages between strategic and operational plans**
Harvest restrictions for the rare physical environments are identified in this DFMP and incorporated into the operational plans.



(3b) Critical Element

Soil Resources

Soil resources are conserved if the ability of soils to sustain forest productivity is maintained within characteristic ranges of variation.

(3b) 1. Value

Soil productivity

(3b) 1.1 Goal

Minimize impact on soil productivity

Soil productivity is directly related to tree productivity (growth and volume). Thus, maintenance of soil productivity is an important consideration for short-term operational planning and long-term sustainable forest management.

(3b) 1.1a. Indicator

Measurement of site quality (site index) based on ecological type (moisture and nutrient regime)

Site quality is a measure of the potential productivity of a site. It is influenced by the amount of water, air and nutrients in the soil that is available for plant growth and development. It is assumed that soil productivity is conserved if site quality is maintained.

(3b) 1.1a.1 Objective

To develop a predictive model of site quality (includes soil productivity) to aid in the formulation of site-specific forest management

Direct and indirect measures of site quality will be used. Direct measures of site quality include site index curves, species site index comparisons and growth intercepts. Indirect measures of site quality include plant indicators, physiographic site classification, ecosystem classification and soil-site evaluation.

- ◆ **Acceptable variance**

The variability in the prediction of site index has been reported in the *Forest Productivity Evaluation Report* by GDC (Canfor 2001).

- ◆ **Current status**

Tree growth (site index) can be used as a surrogate to measure soil productivity (site quality). Canfor has developed site indices (growth and yield tables) for defined yield groups (Canfor 1999h) that play an important role in the prediction of future forest growth. The amount of area forested by site index in relation to yield group is demonstrated in Table 59.

◆ **Forecasting assumptions and analytical methods**

The main assumption is that in natural stands site index is a reasonable direct measure of site quality and a reasonable indirect measure of soil productivity. Canfor has developed a model to predict site quality and potential soil productivity. The model ties tree productivity (site index) to ecological function (ecosite), providing a framework for an ecologically based evaluation of site-specific forest management activities. All assumptions and analytical methods for developing a predictive model of site quality are identified in the final project report, which is currently being evaluated (Canfor 2001).

◆ **Forest management activities**

Until Geographic Dynamics Corp.'s (GDC) report is evaluated, there are no forest management activities associated with this objective.

◆ **Implementation schedule**

The final model has been completed and is currently being evaluated to determine its use in strategic and operational planning.

Table 59. Site Index Summary by Yield Group

DMP_Tables.xls
Table 13

Yield Group	Description	Site Index (m)	Total Area Forested (ha)
1	AW +(S) - AB	18.5	13,911.43
2	AW +(S)-CD	17.7	84,307.14
3	AWSW/PBSW/BWSW	18.1	70,741.99
4	BW/BWAW+(S)	16.7	9,281.77
5	FB+OTHERS	12.0	8,445.25
6	H+(S)/S	17.0	53,460.06
7	PB+(S)	17.7	23,705.38
8	PL/PLFB+(H)	14.7	53,087.79
9	PLAW/AWPL	16.9	19,602.21
10	PLSB+OTHERS	11.0	10,618.15
11	PLSW/SWPL + (H)	16.4	23,145.17
12	SBLT/LTSB (G,M,F)	10.5	57,187.36
13	SBLT/LTSB(U)	7.8	30,016.83
14	SBPL/SBSW/SBFB	11.7	18,903.88
15	SW/SWFB + (H)-AB	13.8	29,980.58
16	SW/SWFB +(H)-CD	13.9	36,485.58
17	SWAW/SWAWPL	15.7	49,415.44
	Total	14.7	592,296.01

Notes on Abbreviations:

Species: PL = Lodgepole pine; SW = White spruce; SB = Black spruce; FB = Balsam fir; LT = Tamarack larch; AW = White aspen (Aspen); BW = White birch; H = Generic for any hardwood species (aspen, birch); S = Generic for any softwood species (pine, spruce, etc.) OTH = includes other unidentified species when FB or PLSB are identified as the main leading species

Species descriptors: AB = refers to A and B stand densities (A being lower stems per ha than B); CD = refers to C and D stand densities (D being the highest stems per ha therefore the most dense type of stand); G,M,F = Timber productivity rating (site index) - "good, medium, fair"; U = timber productivity rating - uncommercial stand type

Source: ORM compiled data



- ◆ **Monitoring procedure**
Site index data (Table 59) used for this DFMP will be used to verify the accuracy of the model.
- ◆ **Linkages between strategic and operational plans**
After the model is evaluated, its use will be determined and any relevant components will be incorporated operationally.

(3b) 1.1b. Indicator

The amount of coarse and fine woody debris on site, post-harvesting

Coarse and fine woody debris consists of stems, branches, tops and leaves. The finer the material, the faster it decomposes and provides nutrients and detritus (functional organic matter) to the soil. Coarser material tends to use up nitrogen near the beginning of the decomposition process; whereas, it adds nitrogen to the soil when more advanced stages of decomposition are reached. The amount of available nitrogen in the soil is a key factor in soil productivity.

(3b) 1.1b.1 Objective

To develop a methodology to measure coarse and fine woody debris on site, post-harvesting

It is desirable to understand the nutrient cycling characteristics of the specific site to effectively manage the amount of woody debris left on site, post-harvest.

- ◆ **Acceptable variance**
It is necessary to manage coarse woody debris (CWD) within the context of harvest operations. As a broad objective, the volume of CWD should not decline as a result of logging. Practically, since both the pre-harvest and post-harvest volumes are sample-based estimates, sampling error is a concern. In setting a target for the retention of CWD, allowance must be made for the sampling error associated with both the pre- and post-harvest CWD estimates.

A target for post-harvest CWD volume for a cutblock needs to be set with respect to the pre-harvest CWD volume. Although the theoretical target is 100% of pre-harvest CWD volume, a practical target of pre-harvest CWD less three times the standard error of the estimate has been set. Operational cruise data collected between 1995-2000 have been compiled to estimate mean CWD and the standard error associated with the estimate.

The amount of CWD left on site post-harvest will depend on the type of stand and the harvest system but, on average, should be no less than 90% of the overall pre-harvest CWD volume as derived from operational cruise data (ORM 2001c). This target is not specific to individual cutblocks, but will be determined by sampling a subset of cutblocks on a periodic basis.

- ◆ **Current status**

Pre-Harvest:

Operational cruise data collected between 1995-2000 was used to establish pre-harvest CWD volumes by yield group (Table 60).



Table 60. Pre-Harvest Coarse Woody Debris Volumes by Yield Group

ORM_DFMP_Tables.xls

Table 9

Yield Group	Description	Pre-Harvest CWD (m3/ha)	Number of Plots
1	AW+(S)-AB AW	89	13
2	AW+(S)-CD AW	108	54
3	AWSW/PBSW/BWSW	75	117
4	BW/BWAW+(S) BW	96	4
5	FB+OTHERS FB	241	55
6	H+(S)/S AW	136	15
7	PB+(S) PB	130	7
8	PL/PLFB+(H) PL	101	302
9	PLAW/AWPL PL	78	46
10	PLSB+OTHERS PL	80	63
11	PLSW/SWPL+(H) PL	136	140
12	SBLT/LTSB(G,M,F) SB	80	71
14	SBPL/SBSW/SBFB SB	70	75
15	SW/SWFB+(H)-AB SW	120	124
16	SW/SWFB+(H)-CD SW	125	316
17	SWAW/SWAWPL SW	86	246

Species: PL = Lodgepole pine; SW = White spruce; SB = Black spruce; FB = Balsam fir; LT = Tamarack larch; AW = White aspen (Aspen); BW = White birch; H = Generic for any deciduous species (aspen, birch); S = Generic for any coniferous species (pine, spruce, etc.) OTH = includes other unidentified species when FB or PLSB are identified as the main leading species

Species descriptors: AB = refers to A and B stand densities (A being lower stems per ha than B); CD = refers to C and D stand densities (D being the highest stems per ha therefore the most dense type of stand); G,M,F = Timber productivity rating (site index) - "good, medium, fair"; U = timber productivity rating - uncommercial stand type

Source: ORM compiled data

The average CWD volumes presented in Table 60 will provide the basis for deriving the overall post-harvest CWD volume target as described in the *Forecasting assumptions and analytical methods* section.

Post-Harvest:

Currently post-harvest volumes are not available however; a survey is being conducted. Future post-harvest CWD surveys will be conducted every two years.

◆ **Forecasting assumptions and analytical methods**

The overall post-harvest volume target (the Target) will be set as ninety percent of the weighted-average of the pre-harvest CWD volumes presented in Table 60. Weights will be determined by the area distribution of harvested blocks by yield group.



Post-harvest CWD surveys will be used to determine the actual (observed) overall average CWD volume levels in harvested blocks. The line Intersect sampling (Van Wagner 1982) is the choice for estimating CWD volumes. Statistical hypothesis testing will be used to determine if the actual post-harvest CWD average volume is not significantly less than the Target at 90 % confidence (ORM 2001). The results of this test, and review of scientific literature and the ecological classification of the FMA area will provide sufficient guidance for developing an effective methodology for the management of woody debris left on site, post-harvest.

It is likely that the program for management of coarse woody debris will have the following characteristics:

- Forest management activities will be based upon the target level of woody debris required on post-harvest blocks. This will vary by the type of stand and by the specific harvesting and silviculture system. On most sites, a range in the size and distribution of woody debris will probably remain;
 - Harvesting contractors and operators will be trained to ensure the target levels of CWD are maintained; and
 - Post-harvest CWD surveys will be conducted every two years to ensure the targets for coarse and fine woody debris are achieved.
- ◆ **Forest management activities**
Forest management activities will be based upon the target level of CWD required on the post-harvest blocks. Management activities aimed at achieving the minimum target levels of CWD should be in accordance with the legislative requirements with reference to the forest health regulations, fire hazard regulations, and waste regulations.
 - ◆ **Implementation schedule**
A post-harvest CWD survey is currently being conducted and evaluation of the methodology for establishing and measuring performance in achieving the targets is in progress.
 - ◆ **Monitoring procedure**
The established average values from the current cruising will be monitored by post-harvest CWD surveys tied into the DFMP targets. The surveys will be conducted every two years commencing 2001 to ensure that the targets for the amount woody debris are achieved. Systematically selected sample units (plots) will provide the framework for monitoring and improving the CWD estimates over time.

Post-harvest data collection methods will be re-evaluated once more data becomes available.

Pre-harvest CWD volumes will also be revised once more information becomes available from operational cruise data and other sources.
 - ◆ **Linkages between strategic and operational plans**
Target levels for coarse and fine woody debris will be achieved through operational practices.

(3b) 1.1c. Indicator

Measure of site disturbance (i.e. ruts and roads)

Soil modifications (disturbances) are primarily classed into 3 categories: compaction, erosion and soil chemical alteration.

Soil modifications affect physical soil processes important to an organism's health, including water supply and flux, heat flux, nutrient availability, soil strength and gas diffusion (McNabb 1995).

(3b) 1.1c.1 Objective

To meet the Forest Soil Conservation Report Guidelines

Soil conservation focuses on 3 main operational areas: roading and decking areas, skidding and site treatment (AFPA and LFS 1999).

The *Forest Soils Conservation Report* is a guideline and working tool to address potential impacts on forest soils such as ruts in the block and amount of internal roading. The impacts of site treatment, although recognized as a factor in the conservation of forest soils, have not been addressed in the report, but will be addressed as a separate report at a later date.

According to the *Forest Soil Conservation Report*:

- “Temporary roads, bared landing areas and displaced soil should not exceed more than 5% of the total cutblock area unless justified in the AOP process. Examples where areas may exceed the 5% may include small block size, topography or in-block chipping operations” (AFPA and LFS 1999: p. 3); and
- “The target is to keep the rutting to less than 2% of the block area as measured by a linear transect system” (AFPA and LFS 1999: p. 6).

◆ **Acceptable variance**

An acceptable level of variance is inherent in the above guidelines.

◆ **Current status**

Targets are achieved through minimizing road widths, use of seismic lines and optimizing economical skidding distance. Blocks are evaluated for their soil, water and landscape characteristics in order to plan and schedule activities that minimize rutting.

Contractors and equipment operators are trained to conduct their work in an environmentally sensitive and safe manner.

◆ **Forecasting assumptions and analytical methods**

Not applicable.

◆ **Forest management activities**

Conduct soil rutting surveys and road measurements on a statistical relevant proportion of the newly harvested areas.

◆ **Implementation schedule**

Canfor will conduct field surveys on a statistically relevant proportion of its newly harvested areas by October 31, 2001 to monitor success at achieving these objectives. Thereafter, sampling will be conducted every 2 years. The results will be evaluated to determine if they meet the established target.



◆ **Monitoring procedure**

Currently, Canfor's EMS inspection forms (for harvesting and silviculture activities) record soil disturbance status. If work is required, mitigative action is undertaken and documented on the comment sheet. The work is then monitored on the next block visit.

The results of the surveys will be monitored in relationship to the targets to determine if objectives have been met.

◆ **Linkages between strategic and operational plans**

The DFMP discusses road access and its affects on strategic and operational planning. The specifics on site disturbance guidelines (e.g. ruts and roads) will be determined in the new ground rules to be developed within 6 months after the approval of this DFMP.

(3b) 2. Value
Soil quantity

(3b) 2.1 Goal
Minimize soil erosion

(3b) 2.1a. Indicator
Occurrence of slumping caused by road construction

Slumping is a term for a type of soil erosion that occurs on a slope. In general, it is a type of mass wasting which is the down-slope movement of rock fragments and/or soil (Mayhew and Penny 1992). Water is an important trigger because it lubricates clay rich strata that often serves as a sliding plane.

(3b) 2.1a.1 Objective
To have zero slumping events from road construction activities in any given operating season

Roads located across steep slopes are the major areas susceptible to slumping. Careful planning (road location) and proper road construction techniques can minimize slumping events. Refer to Section F 4.1.2.3 for additional information regarding steep slope protection.

◆ **Acceptable variance**

Techniques to minimize slumping must be used; however, it is recognized that some slopes are susceptible to slumping. The objective is to have zero slumping events; however, an acceptable level of variance would be 2 slumps in an operating season. All slumps must be documented and preventative and corrective action implemented immediately.

◆ **Current status**

Visual inspections are conducted annually by driving on the main roads and by using aerial reconnaissance on roads that have been put to bed. These inspections (and results) are documented in the Forest Road Maintenance System Database on an annual basis.



There are no major²⁴ slumps in the FMA area. Two minor slumps have occurred in past years, but they are stable and are currently being monitored:

- Adjacent to the south bank of the Wapiti River in 70-5-W6M; and
 - Adjacent to a Class 2 road in 59-5-W6M.
- ◆ **Forecasting assumptions and analytical methods**
Not applicable.
 - ◆ **Forest management activities**
When slumps are identified, the appropriate mitigative action will be undertaken.
 - ◆ **Implementation schedule**
The programs and procedures for identifying and addressing slumps are currently in place.
 - ◆ **Monitoring procedure**
Sections of road prone to high slumping/erosion hazard are identified and tagged for monitoring in the Forest Road Maintenance System (FRMS) database.

Any mass wasting found is reported and documented in the Company's Incident Tracking System (ITS) database, as well as the FRMS and appropriate mitigation measures are applied immediately to prevent further erosion.
 - ◆ **Linkages between strategic and operational plans**
The practice of mitigating slumping is primarily an operational function.

(3b) 2.1b. Indicator

Number of locations that have slumped on sensitive or steep slopes due to harvesting

(3b) 2.1b.1 Objective

To have zero slumping events due to harvesting activities on steep or sensitive slopes

Measures will be carried out to minimize mass wasting from harvesting activities on steep or sensitive slopes. Refer to Section F 4.1.2.3.1.2 for additional information regarding sensitive slopes.

- ◆ **Acceptable variance**
Canfor utilizes techniques to minimize slumping; however, it is recognized that some slumps may still occur. The objective is to have zero major slumping events; however, an acceptable level of variance would be 1 slump

²⁴ Mass wasting within the FMA area is classified as road grade cut failures, or minor and major slumps. The following classification applies for the purposes of measuring and recording the area affected by mass wasting:

- Road grade cut failures affect < or = 100 m²,
- Minor slumps affect < or = 2500 m²; and
- Major slumps affect >2500 m².

per operating season. All slumps, however, must be documented and preventative and corrective action implemented immediately. Depending on the site-specific impact, Canfor will consider retaining a qualified professional to make recommendations regarding the appropriate mitigation measures for mass wasting events.

◆ **Current status**

There are no active slumps on steep or sensitive slopes in harvested areas.

◆ **Forecasting assumptions and analytical methods**

Not applicable.

◆ **Forest management activities**

Steep or sensitive slopes are documented on the block maps and will be used to determine the proper harvesting/treatment procedures.

◆ **Implementation schedule**

The system is being implemented through the Canfor's EMS

◆ **Monitoring procedure**

Areas of steep or sensitive slopes within harvest blocks will be identified in the Cutblock Management System (CBMS) database, recorded on the block maps and scheduled for monitoring.

Any mass wasting found is reported and documented in the Company's Incident Tracking System (ITS) database, as well as the CBMS and appropriate mitigation measures are applied immediately to prevent further erosion.

◆ **Linkages between strategic and operational plans**

The practice of identification and mitigation of slumping is primarily an operational function.



(3c) Critical Element

Water Resources

Water resources are conserved if water quality and quantity is maintained.

(3c) 1. Value

Water quality and quantity

(3c) 1.1 Goal

Conserve water quality and quantity

(3c) 1.1a. Indicator

The amount of siltation caused by road construction in forestry operations

The 3 main sources of sediment in streams are from soil erosion, mass erosion and stream bank erosion (Heatherington 1987). However, the issue of concern is the amount of siltation. When the suspended particles settle out of the water, they may cover gravelly streambeds, which are important spawning grounds for fish in the Salmonidae family (i.e. whitefish, grayling and trout).

(3c) 1.1a.1 Objective

To assess current methodologies and practices to measure siltation caused by forest road construction

Siltation from road construction can cause higher than normal sediment concentrations in watercourses. This increase is usually of short duration and occurs during active road construction, snowmelt and following summer precipitation.

- ◆ **Acceptable variance**

The acceptable variance is zero in assessment of the methodologies and practices to measure siltation. The amount of acceptable variance will be determined once baseline data is collected and analyzed.

- ◆ **Current status**

The Company does not currently measure siltation within streams. However, Canfor conducts its planning and operations in accordance with all the legal requirements for minimizing sedimentation. An *Erosion Control* booklet (Canfor 1992, revised 2000) has been developed which serves as a reference guide and training aid for contractors, their employees and Company supervisors.

- ◆ **Forecasting assumptions and analytical methods**

The program that will be developed for stream crossings, after methodology is determined, will define the baseline criteria against which monitoring data will be compared.



- ◆ **Forest management activities**
The appropriate methodology and practice will be determined for measuring siltation caused by road construction. Refer to Section F 4.1.2.1.1 for additional information regarding quantifying siltation.
- ◆ **Implementation schedule**
Several methodologies have been assessed since submission of the Sustainable Forest Management Plan (SFMP) in July 2000. Further assessment is required in order to develop a sampling program by the September 2001 target date.
- ◆ **Monitoring procedure**
There are 2 parts to the monitoring:
 - The Company will continue to monitor as per the *Canfor Erosion Control* booklet (Canfor 1992) until the assessment is completed; and
 - After an assessment of methodologies and collection of baseline data, a monitoring program will be developed.
- ◆ **Linkages between strategic and operational plans**
The DFMP provides an objective to assess methodologies and practices to measure siltation caused by forest road construction.

(3c) 1.1b. Indicator

The level of response to identified problems regarding siltation

The annual road maintenance inspection program will be used to identify actual and potential siltation events.

(3c) 1.1b.1 Objective

To track mitigative efforts made in response to siltation events found during annual road maintenance inspections

- ◆ **Acceptable variance**
Acceptable variance is zero with respect to development and implementation of mitigative action plans.
- ◆ **Current status**
The Company conducts road maintenance inspections to ensure forestry activities are conducted in a manner that minimizes environmental impact. The Road Maintenance Inspection Program applies to all permanent (LOC) and temporary roads (R roads) (excluding block roads), and watercourse crossings constructed by Canfor. The program monitors:
 - Watercourse crossings;
 - High erosion potential areas;
 - Erosion control measures (planned and completed); and
 - Slumps and road grade cut failures.



Canfor's road monitoring procedure, risk ranking and inspection frequency are described in detail under the *Roads Environmental Program*, which is a component of the Environmental Management System (EMS). The tool for tracking this information is the Forest Road Maintenance System (FRMS).

- ◆ **Forecasting assumptions and analytical methods**
Not applicable.
- ◆ **Forest management activities**
Maintain and follow-up of current status.
- ◆ **Implementation schedule**
The annual road maintenance inspection and tracking program is currently in place.
- ◆ **Monitoring procedure**
Maintain and follow-up of current status. If a non-compliance with a law or regulation or a non-conformance with a Canfor policy is identified, it is recorded in the Company's Incident Tracking System (ITS).
- ◆ **Linkages between strategic and operational plans**
Annual road maintenance inspections are an operational activity.

(3c) 1.1c. Indicator
Amount of forest cover (i.e. buffer zones) along watercourses (in the watershed)

(3c) 1.1c.1 Objective
To manage forest cover along watercourses to meet objectives defined in the DFMP

The main intent is to manage forest cover along watercourses in order to minimize any adverse effects of timber harvesting on water quality and riparian habitat for fish and other wildlife.

- ◆ **Acceptable variance**
Acceptable variance is zero with regards to no harvesting within buffered watercourses, as identified within approved operational plans.
- ◆ **Current status**
Currently, 6.2% of the FMA area (40,000 ha) is assigned to watercourse buffers. These buffer areas were excluded from the landbase as part of the net-down process for the calculation of the AAC as per current Operating Ground Rules.

Buffers are currently managed according to *Timber Harvest Planning and Operating Ground Rules* (Canfor 1988); as follows:
 - Large permanent watercourses - no disturbance or removal of merchantable timber within 60 m of the high water mark, unless approved by forest officer in writing;



- Small permanent watercourses - no disturbance or removal of merchantable timber within 30 m of the high water mark, unless approved by forest officer in writing;
 - Intermittent watercourses - no buffer required unless requested by a forest officer in writing;
 - Lakes (with recreational value) greater than 4 ha - no disturbance or removal of merchantable timber within 100 m of the high water mark, unless approved by forest officer in writing; and
 - Lakes (with little or no recreational value) greater than 16 ha - no disturbance or removal of merchantable timber within 100 m of the high water mark, unless approved by forest officer in writing.
- ◆ **Forecasting assumptions and analytical methods**
Buffers will continue to be designated along watercourses to minimize any adverse effects of timber harvesting on water quality and riparian habitat.
 - ◆ **Forest management activities**
The intent is to manage buffers according to the current ground rules until new ground rules that allow greater flexibility to manage buffers for wildlife habitat, are co-operatively developed with Alberta Sustainable Resource Development. Canfor is committed to conducting an assessment of buffers to assess their relationship to natural disturbance processes in order to determine their efficient application.
 - ◆ **Implementation schedule**
The implementation schedule is outlined in this DFMP.
 - ◆ **Monitoring procedure**
The forest management activities occurring within the watercourse buffers will be continually evaluated to ensure they follow the current ground rules. After the 'new' ground rules are developed, monitoring of forest activities will be based on the new standards.
 - ◆ **Linkages between strategic and operational plans**
Watercourse buffers are managed to meet the operational ground rules. Any deviations to the present operating ground rules require approval from Alberta Sustainable Resource Development.

(3c) 1.1d. Indicator

Number of incidents of excursions of herbicide

There are 2 primary regulations that deal with herbicides in Alberta and they fall under the pesticide regulations in the *Alberta Environment Protection and Enhancement Act* (Alberta Environmental Protection 1992):

- Pesticide (Ministerial) Regulation (AR 43/97); and
- Pesticide Sales, Handling, Use and Application Regulation (AR 24/97).

Herbicide application and use are also governed by the *Environmental Code of Practice – Pesticides*. Herbicides may be used for conifer release or to prepare a site for artificial regeneration of desired tree species, provided the sites meet



conditions outlined in *Guidelines for the Use of Herbicides for Silvicultural in Alberta* (Alberta Environmental Protection 1998).

(3c) 1.1d.1 Objective

To have zero excursions of herbicides in water

An excursion occurs when any vegetation outside the target zone is affected by herbicide. Refer to Section F 15.9.3.2 for additional information regarding herbicides.

- ◆ **Acceptable variance**

The acceptable variance for an excursion is zero.

- ◆ **Current status**

Canfor embarked on the “go-slow” herbicide experience building program in 1995 with a stem injection herbicide (Vision[®] silviculture herbicide) project of approximately 80 ha in area. This was followed with 250 ha of single-stem stand tending using basal bark application of Release[®] silviculture herbicide to woody competition in a defined radius around coniferous crop trees in 1996. In 1997, approximately 450 ha were treated again using basal bark application to treat defined radii around crop trees.

Since meeting operational experience requirements in 1997, Canfor has a herbicide stand tending program based on treatment needs. In 1998, Canfor began using a wider array of herbicide treatments based on competition species, density and crop tree status. In 1998, 1,179 ha were treated followed by 1,988 ha in 1999 and 2,087 ha in 2000 (Table 37).

The array of treatment types (4 to 6) and how treatments are prescribed became much more prescriptive in 1998. Other treatment methods including motor-manual, girdling, clipping and grazing were added to the suite of treatments considered in making prescriptions. This document moved from a herbicide use proposal to being a fully developed stand tending/vegetation management plan.

Canfor reports all excursions to the Land and Forest Division (LFD) in accordance with regulations. Canfor had one slight excursion in 1998 (understorey vegetation damage only) and one excursion in 1999 (aerial spraying occurred in an incorrect block) which was reported in the *Canfor 2000 Vegetation Management Plan and Herbicide Proposal*. Neither of these excursions impacted any watercourses. In 2000, there were 0 excursions.

- ◆ **Forecasting assumptions and analytical methods**

The assumption is that no excursions in the water occurred if the vegetation adjacent to the water body has no indication of being adversely affected by the herbicide application one year after application (Canfor 2000g).

- ◆ **Forest management activities**

Canfor follows legislated protocols outlined in Articles 43/97 and Article 24/97 within the *Alberta Environment Protection and Enhancement Act*. Canfor also adheres to recommendations outlined in the *Guidelines for the Use of Herbicides for Silvicultural in Alberta* (Alberta Environmental Protection 1998) to:



- Minimize herbicide use;
 - Protect wildlife;
 - Maintain block diversity;
 - Maintain habitat diversity;
 - Avoid watercourses;
 - Properly apply specific herbicides;
 - Involve and notify the public; and
 - Monitor the short-term and long-term effects of herbicide use.
- ◆ **Implementation schedule**
Current status will be maintained. Practices are in place to prevent herbicide excursions and the annual monitoring and reporting system is being used.
- ◆ **Monitoring procedure**
Canfor's herbicide monitoring program has 2 primary components: monitoring during operations and follow-up monitoring.

During operations

During basal bark and backpack foliar applications, the Canfor designated on-site supervisor monitors and records application details: areas, product use and times. The supervisor also monitors and records weather information: wind (speed and direction), temperature and relative humidity.

For aerial applications, the Canfor on-site supervisor monitors and conducts all reconnaissance flights with the pilot, supervises the block monitors and reports any excursions or other incidents to Land and Forest Division (LFD). Most importantly, the supervisor works with pilots and monitors to ensure Canfor standard operating procedures are followed and risk of off-target application is minimized. The block monitors (either Canfor employees or independent contractor employees) assess and record weather conditions. They relay this information to the site supervisor and the pilot and participate in spray-no spray decisions. The monitors record loads and times for blocks they monitor. Finally, they give the pilot feedback on spray pattern behavior.

Pilots work with the site supervisor and the monitors to make spray-no spray decisions. The pilot is ultimately in charge of ensuring safe, accurate application. If an incident or excursion occurs and the pilot is aware of it, he is responsible for reporting to the site supervisor. The pilot maintains a set of load and treatment records.

On the aerial application program, a new system of block control will be used. On the reconnaissance flight, the Canfor supervisor will confirm the block location with the pilot and GPS coordinates taken to ensure return to the same block. Blocks will not be sprayed without a monitor present in the block. When the monitor is positioned, the Canfor supervisor will confirm location. If there is any disagreement between the monitor and pilot as to block location, no spraying will occur until the Canfor supervisor resolves the location concern.



The mixers ensure loads are mixed correctly and record where loads went and what area was treated. When the pilot and the mixer records can not be reconciled, the monitor records act as a check and balance.

Follow-up monitoring

Follow-up monitoring includes an evaluation of treatment effectiveness, excursions and operational herbicide monitoring plots.

Internal monitoring mechanisms will ensure stand tending treatments are achieving their goals and not jeopardizing coniferous or deciduous fiber supply. If this is not the case, treatment threshold and intervention options will be adjusted to better achieve the goals of this DFMP.

Excursions known to have occurred at the time of treatment are reported immediately to Land and Forest Division (LFD) using the Herbicide Excursion Reporting Form found in the *Forest Management Herbicide Reference Manual* (Alberta Environmental Protection 1999b). An excursion assessment flight is made the spring after treatment. All blocks where excursions are suspected to have occurred are flown. Twenty-five percent of the total area treated with herbicides is also flown on a random check basis. If excursions are found, they are evaluated and sampling intensity may be increased as a result.

Canfor has established 3 operational herbicide-monitoring plots that are annually re-measured and evaluated.

◆ **Linkages between strategic and operational plans**

Herbicide application and monitoring is primarily an operational function; however, strategies for herbicide use are identified in this DFMP.

(3c) 2. Value
Water cycle

(3c) 2.1 Goal
Minimize the effect of the removal of forest cover on the water cycle

(3c) 2.1a. Indicator
Amount of forest cover removed and its spatial distribution within a defined watershed

Water yield refers to streamflow quantity and timing. It is of concern since streamflow is a key determinant of the energy available for erosion, transport and deposition of sediment within channels. Streamflow is also a key component in determining the morphology of channels, with implications for the quality and quantity of fish habitat. Finally, water yield is an important component in determining the availability and suitability of water for beneficial uses.

Water yield quantity and timing can be altered by compaction or disturbance of the ground surface, as with roads and skid trails. Water yield is also affected by



vegetation growth or removal. Water yield generally increases after timber harvest through a reduction in transpiration and precipitation interception losses. Removal of forest canopy also affects snow accumulation and melt processes, often resulting in an increase in snowpack accumulation and melt rates, thereby increasing runoff rate and volume (Various 1997).

(3c) 2.1a.1 Objective

To not exceed a range of 20-40% of forest cover removal, above the “H60” line, in relationship to the total vegetated area within a defined watershed as per the DFMP

Water yield increases can be directly modelled, but equivalent clearcut area (ECA) is often used as a surrogate. ECA is a primary factor considered in an evaluation of the potential effect of past and proposed forest harvesting on water yield. ECA is usually expressed as a percent of watershed area. The index (hydrological recovery) takes into account the initial percentage of crown removal and the recovery through regrowth of vegetation since the initial disturbance (Various 1997).

H60 is the elevation above which 60% of the watershed lies. The watershed area above the H60 is considered as the source area for the major snowmelt peak flows (B.C. Ministry of Forests 1999).

Canfor is committed to working co-operatively with ASRD to review information, identify issues and determine the appropriate courses of action for evaluating water yield based on ECA targets (35% within Bull trout area and 40% in the remaining area) of two watersheds selected in co-operation with Fish and Wildlife Division.

Canfor also commits to monitoring harvest levels below the H60 line (i.e., remaining 40%).

Refer to Section F 4.1.1 for additional information regarding water yield.

◆ **Acceptable variance**

Within a defined watershed, total vegetated cover removal will not exceed 35% ECA above the H60 within the Bull trout area and 40% in the remaining area. Total vegetated area includes the forested and non-forested vegetated covers.

◆ **Current status**

Canfor adheres to the current *Timber Harvest Planning and Operating Ground Rules* (Canfor 1988) regarding percent removal of merchantable timber in accordance with Section 4.1 which stipulates:

“approximately 50 percent of the merchantable volume covering 50 percent of the merchantable area may be harvested in the first cut (unless approved otherwise) with the balance to be taken in the second cut, in order to:

- Minimize the impact on watershed, wildlife, aesthetics and site productivity;
- Break up the continuity of slash fuels and forest cover types; and



- Reduce susceptibility to destructive agencies.”

A need has been identified to determine the effect of forest cover removal on water yield and the objective noted above has been developed. As a result, Canfor is moving towards adherence to this new objective.

The H60 line has been determined for all watersheds aggregated up to a minimum of 500 ha in the bull trout area and up to a minimum of 1,000 ha for the remainder of the FMA area (Figure 133). The components necessary to calculate the ECA have been determined. The components are listed below:

- Streams have been reclassified according to Strahler;
- Major and sub-watershed areas;
- Bull trout area;
- H60 areas within watersheds;
- Forested area by watershed;
- Amount of forested areas, forest cover removed (harvested area), non-forest vegetated area, non-vegetated area and roads by watershed; and
- Hydrological recovery (for fully stocked stands) is defined in Table 61.

Table 61. Hydrological Recovery

DMP_Tables.xls
Table 14

Height (m)	% Recovery
0	0
1	20
2	40
3	60
4	80
5	100

Source: ORM compiled data.

There are a total of 297 watersheds in the FMA area. Hydrography, digital elevation model (DEM) and watershed data sets were developed for the FMA area by GISmo Solutions Ltd. (Canfor 1998g). These data sets were utilized to define watershed used in the calculation of ECA% (Canfor 2001m). The watersheds were first classified using Strahler²⁵, resulting in watersheds identified as stream orders 1 through 8. Stream orders were then aggregated chronologically to a maximum of 500 ha in the Bull trout area and 1,000 ha for the balance of the FMA area (ORM 2001d). A more detailed description of

²⁵ A hierarchical stream order classification system developed by A. Strahler that numerologically identifies streams commencing at the upper reaches of a watershed and concluding at the lower reaches. The system begins by numbering all non-branching channels as a first order. When two first order streams meet, the channel is identified as a second order; when two second order streams meet, the channel becomes third order; and so on. Refer to the Section L (Glossary) for a schematic illustrating the *Strahler Classification System*.

the data is in the report titled *Hydrological Recovery Based on Equivalent Clearcut Area* (Canfor 2001m). A summary of the watersheds above the ECA of 35% in the bull trout area and above the ECA of for the remainder of the FMA area flagged for concern is presented in Table 55. Since there are no ECAs above the 40% flagged for concern for areas outside the Bull trout area, the Table 55 referenced in “Critical Element 1b, Objective 1.1b.2” (bull trout section of habitat constraint modelling) can be used in this section as well. Further information regarding the flagging (concern area) is in the section on *Forecasting assumptions and analytical methods* below.

◆ **Forecasting assumptions and analytical methods**

It is assumed that streamflow maximums will not adversely impact the ecosystem if no more than 20-40% of the total vegetated cover is removed within the area above the H60 within a defined watershed. As the outcomes in relation to the ECAs are not fully understood, the following procedure will be used to evaluate watersheds that may require further adjustments:

- A base 0 (ECA value) has been calculated (Canfor 2001m) which includes the 1999 AOP proposed areas as part of the harvested areas. The need to do this is to demonstrate present ECA values that will not change;
- Olympic Resource Management’s report for year 10 (2009) and year 20 (2019) was based on the resource and timber supply analysis; and
- The following criteria will be used to flag areas of concern:
 - ECA >35% in bull trout area;
 - ECA >40% outside bull trout area; and
 - Visual representation.

◆ **Forest management activities**

Flagged areas of concern will be evaluated and action will be taken depending on the level of importance. Such action could be:

- No change to be made within the DFMP; however, areas of concern will be flagged for operational considerations; and
- Adjustments to the harvest sequencing in the *Resource and Timber Supply Analysis* (RTSA).
- Canfor is committed to co-operate with ASRD to refine the hydrological recovery graph utilized in this objective. Regeneration survey data (tree height) will be used to validate the hydrological recovery for each yield group and, as the new information is available, to utilize it for determination of ECA.

◆ **Implementation schedule**

Implementation of the above strategies for the RTSA is in this DFMP.

As per the Forest Management Agreement, subparagraph 16(2), ‘new’ operational ground rules will be completed within 6 months after the approval of the DFMP.



◆ **Monitoring procedure**

Canfor will monitor the harvest sequence, as part of the RTSA, in order to evaluate the effect on the ECA to determine if any adjustments are required.

Each watershed will be monitored, as harvested areas are planned, to ensure that there is less than 40% ECA or such ECA percentage as defined in this DFMP.

It should be noted that ECA is one of the methods being used. Many agencies are utilizing ECA as a surrogate for water yield. The Company will keep informed of research being conducted on ECA throughout North America.

◆ **Linkages between strategic and operational plans**

The DFMP defines the operational strategies for implementing and monitoring the ECA in future planning areas.



4. Criterion

Forest Ecosystem Contributions to Global Ecological Cycles

Forest conditions and management activities contribute to the health of global ecological cycles.

(4a) Critical Element

Global Ecological Cycles

The processes that are responsible for recycling water, carbon, nitrogen, and other life-sustaining elements are maintained.

(4a) 1. Value

Local contribution to global ecological cycles

Due to the complexity of global ecological cycles, it is often difficult to visualize the impact the local forests have on the global environment. Forests are particularly important to global cycles because of their long life span, vast area and their unique characteristics as efficient carbon storehouses.

(4a) 1.1 Goal

Minimize disturbances that negatively impact carbon cycles

Both natural and human-induced disturbances, including fires, insects, diseases and harvesting, affect the movement of carbon from forests and forest soils to the atmosphere.

(4a) 1.1a. Indicator

Amount of area under forest cover

It is widely understood that forests and forest soils represent large reservoirs of carbon that have accumulated over hundreds and thousands of years. Thus, altering the amount of land that is forested has a notable impact on the global carbon cycle. It is important to have the forests continually growing (evergreen).

(4a) 1.1a.1 Objective

All harvested sites are treated within 18 months after the end of the timber year

- ◆ **Acceptable variance**

A level of variance of +3 months is acceptable in order to accommodate the occurrence of fire and periods of extreme weather conditions, including floods



and drought. These natural events could delay the treatment of harvested areas.

◆ **Current status**

Section 141.1(1) of the *Timber Management Regulation* (Alberta Regulation 60-73) states that reforestation in a cut unit must occur within 2 years after the end of the year of the cut. All harvested areas in the FMA area are properly treated within 18 months after the end of the timber year as of the 1996 timber year (Canfor 2000h), thereby exceeding the Alberta Provincial regulations pertaining to reforestation. Refer to Section F 15.2 for additional information regarding Canfor's approach to reforestation.

◆ **Forecasting assumptions and analytical methods**

No forecasting or analysis is required.

◆ **Forest management activities**

Pre-harvest silviculture prescriptions (PHSP) will be assigned to all proposed harvested areas in order to plan silviculture activities in a timely manner to meet the stated objective (refer to "Critical Element 6f, Objective 1.1a.2).

◆ **Implementation schedule**

It is currently implemented as of the 1996 timber year.

◆ **Monitoring procedure**

All harvested sites will be monitored to ensure that site treatment occurs within 18 months from the end of the timber year in which the block was harvested. Silvicultural records are maintained.

◆ **Linkages between strategic and operational plans**

All site treatment strategies follow the strategic direction as outlined in this DFMP.

(4a) 1.1b. Indicator

Number of occurrences and amount of area impacted by fire and catastrophic events of insects, disease, windfall, etc.

Forest stand dynamics strongly influence the process of carbon exchange and storage in the boreal forest. When catastrophic events occur on a large scale, both in area and frequency, the overall forest age is shifted back to younger stands, resulting in reduced carbon storage in biomass (Kurz and Apps 1993; Kurz *et al* 1995). Although younger stands do accumulate carbon at a higher rate than do older stands, converting older to younger does not decrease the amount of carbon released into the atmosphere because of the abundance of already stored carbon in older aged stands (Harmon *et al* 1990). Therefore, controlling the rate of stand senescence through proper forest management could have direct benefits in controlling global carbon cycles. An important step in this process would be to decrease the amount of area lost to fire and other catastrophic events.

Refer to Section F 19 for additional information regarding forest health.



(4a) 1.1b.1 Objective

Limit the number of occurrences and amount of area impacted by fire and catastrophic events of insects, disease, windfall, etc.

◆ **Acceptable variance**

The target for occurrences is zero; however, there is an inherent level of variability built in to natural processes and the Company develops a *Forest Protection Plan* for managing risks.

Canfor has no control over human-caused fires (i.e. public), other industrial or lightning-caused fires; however, the Company does have control over fires caused by its operations. The acceptable variance for Company-caused fires is zero. The risks associated with the other fires are managed by assisting the Alberta Sustainable Resource Development during high hazard conditions to reduce the potential area impacted.

The acceptable variance for catastrophic events of insects, disease, or windfall within the FMA area is zero.

Any fire, or other events identified in the objective, must be investigated for preventative action.

For additional information regarding Forest Protection, refer to Section F 20.

◆ **Current status**

As reported in the *Forest Protection Plan* (Canfor 2000e), there have been 178 fires in the FMA area during the last 15 years (1986-2000 inclusive), impacting a total of 187.4 ha. The average number of fire occurrences per year in the past 15 years has been 12, impacting an average of 12.5 ha a year. Forty-two percent (78.8 ha) of the burned area has been reforested. Refer to Section C 2.5.1.

There have been no catastrophic events of insect and disease in the FMA area since 1964.

Prior to 1997 no windfall assessment surveys were conducted within the FMA area, however, windfall was addressed operationally as found. In 1997 a windfall assessment survey was conducted in the FMA area. As a result, a number of patches (130 ha) in FMU G5C and E8 (in a localized area) were identified as catastrophic windfall (i.e. area(s) of windfall that significantly affect the AAC). These patches were harvested in the 1998-1999 season, salvaging approximately 32,000 m³.

Based on a reconnaissance survey in FMU G2C, approximately 231 ha were harvested in 1999 in a catastrophic windfall area salvaging approximately 39,500 m³.

◆ **Forecasting assumptions and analytical methods**

Alberta Sustainable Resource Development prepares fire weather, fire hazard and fire spread indices that assist to forecast forest protection personnel and equipment requirements.



◆ **Forest management activities**

Current forest management practices fall under provincial pre-suppression and wildfire suppression programs as well as insect and disease monitoring and control programs (Alberta Environmental Protection 1996a). Canfor works with the provincial government to assist in the delivery of these programs. Canfor's *Forest Protection Plan* (Canfor 2000e) provides greater detail on its programs for insect and disease as well as fire prevention.

To limit the occurrences of fire, the following activities occur:

- Development of a *Forest Protection Plan* including such activities as:
 - Assignment of Canfor personnel as fire duty officers each weekend during the fire season to act as the first contact for the Alberta Sustainable Resource Development; and
 - Undertaking of infrared scanning each spring of all areas in which pile burning has occurred (within the recent winter months) in order to detect any hold over fires and to take the appropriate action to prevent a fire outbreak.
- Providing financial aid to supplement deployment of fire protection resources; and
- Research into silvicultural applications emulating fires is currently being undertaken by the EMEND Project, which is in part funded by Canfor (Canadian Forest Service 2000).
- An assessment in FMU G2C was conducted and some significant windfall areas were incorporated into the 2001 AOP.

◆ **Implementation schedule**

The programs for monitoring and addressing fire and catastrophic events of insect, disease and windfall are currently in place.

◆ **Monitoring procedure**

The number and occurrences of fires are tracked and reported annually in the *Forest Protection Plan* (Canfor 2000e).

The *Forest Protection Plan* also includes protocols for reporting insect, disease and noxious weeds.

Insect and disease outbreaks and catastrophic windfall events are monitored and appropriate action taken to reduce their spread.

◆ **Linkages between strategic and operational plans**

Fire control and prevention, and reporting of insect, disease and noxious weeds, are primarily operational functions that are described in the *Forest Protection Plan* (Canfor 2000e). Practices to address windfall are discussed within the DFMP.



(4a) 1.1c. Indicator

The numbers of equipment in use and amount of technology with low carbon dioxide (CO₂) and nitrogen oxides (NO_x) emissions

Nitrogen oxides (NO_x) are a major pollutant in the atmosphere, being a precursor to acid rain, photochemical smog and ozone accumulation.

Carbon dioxide is a greenhouse gas of major concern in the study of global warming. It is estimated that the amount in the air is increasing by 0.4% annually. Anthropogenic carbon dioxide is emitted mainly through the burning of fossil fuels and deforestation.

(4a) 1.1c.1 Objective

To promote use of equipment and technology that minimizes CO₂ and NO_x emissions

- ◆ **Acceptable variance**
Not known to date.
- ◆ **Current status**
No programs are in place to address this issue.
- ◆ **Forecasting assumptions and analytical methods**
No forecasting or analysis is required.
- ◆ **Forest management activities**
The following tasks will be undertaken:
 - Identify all equipment and technologies, in the woodlands operation, that are potential sources of CO₂ and NO_x emissions;
 - Identify alternative sources of equipment and technologies that can be used to reduce CO₂ and NO_x emissions; and
 - Design programs that will promote the use of new CO₂ and NO_x reduction equipment and technologies.
- ◆ **Implementation schedule**
A program to promote the use of CO₂ and NO_x friendly equipment and technologies will be in place by June 2002.
- ◆ **Monitoring procedure**
The changes that have been made by Canfor and its contractors to utilize CO₂ and NO_x friendly equipment and technologies will be monitored.
- ◆ **Linkages between strategic and operational plans**
A program to promote the use of CO₂ and NO_x friendly equipment is primarily an operational function.



(4a) 1.2 Goal**Minimize disturbances that negatively impact water cycles****(4a) 1.2a. Indicator****Amount of forest cover removed and its spatial distribution within a defined watershed**

Water yield refers to streamflow quantity and timing. It is of concern since streamflow is a key determinant of the energy available for erosion, transport and deposition of sediment within channels. Streamflow is also a key component in determining the morphology of channels, with implications for the quality and quantity of fish habitat. Finally, water yield is an important component in determining the availability and suitability of water for beneficial uses.

Water yield quantity and timing can be altered by compaction or disturbance of the ground surface, as with roads and skid trails. Water yield is also affected by vegetation growth or removal. Water yield generally increases after timber harvest through a reduction in transpiration and precipitation interception losses. Removal of forest canopy also affects snow accumulation and melt processes, often resulting in an increase in snowpack accumulation and melt rates, thereby increasing runoff rate and volume (Various 1997).

(4a) 1.2a.1 Objective**To not exceed a range of 20-40% of forest cover removal, above the “H60” line, in relationship to the total vegetated area within a defined watershed as per the DFMP**

Water yield increases can be directly modelled, but equivalent clearcut area (ECA) is often used as a surrogate. ECA is a primary factor considered in an evaluation of the potential effect of past and proposed forest harvesting on water yield. ECA is usually expressed as a percent of watershed area. The index (hydrological recovery) takes into account the initial percentage of crown removal and the recovery through regrowth of vegetation since the initial disturbance (Various 1997).

H60 is the elevation above which 60% of the watershed lies. The watershed area above the H60 is considered as the source area for the major snowmelt peak flows (B.C. Ministry of Forests 1999).

Refer to Section F 3.1.1 for additional information regarding water yield.

◆ Acceptable variance

Within a defined watershed, total vegetated cover removal will not exceed 35% ECA above the H60 within the Bull trout area and 40% in the remaining area. Total vegetated area includes the forested and non-forested vegetated covers.

◆ **Current status**

Canfor adheres to current *Timber Harvest Planning and Operating Ground Rules* (Canfor 1988) regarding percent removal of merchantable timber in accordance with Section 4.1 which stipulates:

“approximately 50 percent of the merchantable volume covering 50 percent of the merchantable area may be harvested in the first cut (unless approved otherwise) with the balance to be taken in the second cut, in order to:

- Minimize the impact on watershed, wildlife, aesthetics and site productivity;
- Break up the continuity of slash fuels and forest cover types; and
- Reduce susceptibility to destructive agencies.”

A need has been identified to determine the effect of forest cover removal on water yield and the objective noted above has been developed. As a result, Canfor is moving towards adherence to this new objective.

The H60 line has been determined for all watersheds aggregated up to a minimum of 500 ha in the bull trout area and up to a minimum of 1,000 ha for the remainder of the FMA area (Figure 133). The components necessary to calculate the ECA have been determined. The components are listed below:

- Streams have been reclassified according to Strahler;
- Major and sub-watershed areas;
- Bull trout area;
- H60 areas within watersheds;
- Forested area by watershed;
- Amount of forested areas, forest cover removed (harvested area), non-forest vegetated area, non-vegetated area and roads by watershed; and
- Hydrological recovery (for fully stocked stands is defined in Table 61).

There are a total of 297 watersheds in the FMA area. Hydrography, digital elevation model (DEM) and watershed data sets were developed for the FMA area by GISmo Solutions Ltd. (Canfor 1998g). These data sets were utilized to define watershed used in the calculation of ECA% (Canfor 2001m). The watersheds were first classified using Strahler²⁶, resulting in watersheds identified as stream orders 1 through 8. Stream orders were then aggregated chronologically to a maximum of 500 ha in the Bull trout area and 1,000 ha for the balance of the FMA area (ORM 2001d). A more detailed description of the data is in the report titled, *Hydrological Recovery Based on Equivalent Clearcut Area* (Canfor 2001m). A summary of the watersheds above the ECA of 35% in the Bull trout area and above the ECA of 40% for the

²⁶ A hierarchical stream order classification system developed by A. Strahler that numerologically identifies streams commencing at the upper reaches of a watershed and concluding at the lower reaches. The system begins by numbering all non-branching channels as a first order. When two first order streams meet, the channel is identified as a second order; when two second order streams meet, the channel becomes third order; and so on. Refer to the Section L (Glossary) for a schematic illustrating the *Strahler Classification System*.

remainder of the FMA area flagged for concern is presented in Table 55. Since there are no ECAs above the 40% flagged for concern for areas outside the bull trout area, the Table 55 referenced in “Critical Element 1b, Objective 1.1b.2” (bull trout section of habitat constraint modelling) can be used in this section as well. Further information regarding the flagging (concern area) is in the section on Forecasting assumptions and analytical methods below.

◆ **Forecasting assumptions and analytical methods**

It is assumed that streamflow maximums will not adversely impact the ecosystem if no more than 20-40% of the total vegetated cover is removed within the area above the H60 within a defined watershed. As the outcomes in relation to the ECAs are not fully understood, the following procedure will be used to evaluate watersheds that may require further adjustments:

- A base 0 (ECA value) has been calculated (Canfor 2001m) which includes the 1999 AOP proposed areas as part of the harvested areas. The need to do this is to demonstrate present ECA values that will not change;
 - Olympic Resource Management’s report for year 10 (2009) and year 20 (2019) was based on the *Resource and Timber Supply Analysis* (RTSA); and
 - The following criteria will be used to flag areas of concern:
 - ECA >35% in Bull trout area;
 - ECA >40% outside Bull trout area; and
 - Visual representation.

◆ **Forest management activities**

Flagged areas of concern will be evaluated and action will be taken depending on the level of importance. Such action could be:

- No change to be made within the DFMP; however, areas will be flagged for operational considerations; and
- Adjustments to the harvest sequencing in the RTSA.
- Canfor is committed to co-operate with ASRD to refine the hydrological recovery graph utilized in this objective. Regeneration survey data (tree height) will be used to validate the hydrological recovery for each yield group and, as the new information is available, to utilize it for determination of ECA.

◆ **Implementation schedule**

Implementation of the above strategies for the RTSA will be in this DFMP.

New operational ground rules will be completed within 6 months after the approval of the DFMP.

◆ **Monitoring procedure**

Canfor will monitor the harvest sequence, as part of the RTSA, in order to evaluate the effect on the ECA to determine if any adjustments are required.



Each watershed will be monitored, as harvested areas are planned, to ensure that there is less than 40% ECA or such ECA percentage as defined in this DFMP.

It should be noted that ECA is one of the methods being used. Many agencies are utilizing ECA as a surrogate for water yield. The Company will keep informed of research being conducted on ECA throughout North America. After the DFMP approval, the ECA will be evaluated to determine if ECA percentages are realistic or if there is another procedure.

- ◆ **Linkages between strategic and operational plans**

The DFMP defines the operational strategies for implementing and monitoring the ECA in future planning areas.

(4a) 1.3 Goal

Minimize disturbances that negatively impact nitrogen cycles

(4a) 1.3a. Indicator

The amount of coarse and fine woody debris on site, post-harvesting

Coarse and fine woody debris consists of stems, branches, tops and leaves. The finer the material, the faster it decomposes and provides nutrients and detritus (functional organic matter) to the soil. Coarser material tends to use up nitrogen near the beginning of the decomposition process; whereas, it adds nitrogen to the soil when more advanced stages of decomposition are reached. The amount of available nitrogen in the soil is a key factor in soil productivity.

(4a) 1.3a.1 Objective

To develop a methodology to measure coarse and fine woody debris on site, post-harvesting

It is desirable to understand the nutrient cycling characteristics of the specific site to effectively manage the amount of woody debris left on site, after harvest.

- ◆ **Acceptable variance**

It is necessary to manage coarse woody debris (CWD) within the context of harvest operations. As a broad objective, the volume of CWD should not decline as a result of logging. Practically, since both the pre-harvest and post-harvest volumes are sample-based estimates, sampling error is a concern. In setting a target for the retention of CWD, allowance must be made for the sampling error associated with both the pre- and post-harvest CWD estimates.

A target for post-harvest CWD volume for a cutblock needs to be set with respect to the pre-harvest CWD volume. Although the theoretical target is 100% of pre-harvest CWD volume, a practical target of pre-harvest CWD less three times the standard error of the estimate has been set. Operational

cruise data collected between 1995-2000 have been compiled to estimate mean CWD and the standard error associated with the estimate.

The amount of CWD left on site post-harvest will depend on the type of stand and the harvest system but, on average, should be no less than 90% of the overall pre-harvest CWD volume as derived from operational cruise data (ORM 2001c). This target is not specific to individual cutblocks, but will be determined by sampling a subset of cutblocks on a periodic basis.

◆ **Current status**

Pre-Harvest:

Operational cruise data collected between 1995-2000 was used to establish pre-harvest CWD volumes by yield group (Table 60).

The average CWD volumes presented in Table 60 will provide the basis for deriving the overall post-harvest CWD volume target as described in the "Forecasting assumptions and analytical methods" section.

Post-Harvest:

Currently post-harvest volumes are not available however; a survey is being conducted. Future post-harvest CWD surveys will be conducted every two years.

◆ **Forecasting assumptions and analytical methods**

The overall post-harvest volume target (the Target) will be set as ninety percent of the weighted-average of the pre-harvest CWD volumes presented in Table 60. Weights will be determined by the area distribution of harvested blocks by yield group.

Post-harvest CWD surveys will be used to determine the actual (observed) overall average CWD volume levels in harvested blocks. The line Intersect sampling (Van Wagner 1982) is the choice for estimating CWD volumes. Statistical hypothesis testing will be used to determine if the actual post-harvest CWD average volume is not significantly less than the Target at 90 % confidence (ORM 2001). The results of this test, and review of scientific literature and the ecological classification of the FMA area will provide sufficient guidance for developing an effective methodology for the management of woody debris left on site, post-harvest.

It is likely that the program for management of coarse woody debris will have the following characteristics:

- Forest management activities will be based upon the target level of woody debris required on post-harvest blocks. This will vary by the type of stand and by the specific harvesting and silviculture system. On most sites, a range in the size and distribution of woody debris will probably remain;
- Harvesting contractors and operators will be trained to ensure the target levels of CWD are maintained; and
- Post-harvest CWD surveys will be conducted every two years to ensure the targets for coarse and fine woody debris are achieved.

- ◆ **Forest management activities**
Forest management activities will be based upon the target level of CWD required on the post-harvest blocks. Management activities aimed at achieving the minimum target levels of CWD should be in accordance with the legislative requirements with reference to the forest health regulations, fire hazard regulations, and waste regulations.
- ◆ **Implementation schedule**
A post-harvest CWD survey is currently being conducted and evaluation of the methodology for establishing and measuring performance in achieving the targets is in progress.
- ◆ **Monitoring procedure**
The established average values from the current cruising will be monitored by post-harvest CWD surveys tied into the DFMP targets. The surveys will be conducted every two years commencing 2001 to ensure that the targets for the amount woody debris are achieved. Systematically selected sample units (plots) will provide the framework for monitoring and improving the CWD estimates over time.

Post-harvest data collection methods will be re-evaluated once more data becomes available.

Pre-harvest CWD volumes will also be revised once more information becomes available from operational cruise data and other sources.
- ◆ **Linkages between strategic and operational plans**
Target levels for coarse and fine woody debris will be achieved through operational practices).

(4a) 1.3b. Indicator

Presence of vascular plant species that can be used to indicate potential nitrogen levels

It is widely believed that many forest floor and understorey plant species can provide relatively precise information on most growth-related site quality factors (Corns and Pluth 1984; La Roi *et al* 1988). Because direct measures of site quality are time consuming and expensive, plant species that convey information about nitrogen offer a cost-effective alternative to intensive site evaluations. Information on site nitrogen will help to minimize impacts to nitrogen cycles and, thus, allow forest managers to more effectively select practices that maintain productivity.

(4a) 1.3b.1 Objective

To understand, through modelling, the role of vascular plants as indicators of potential nitrogen levels

- ◆ **Acceptable variance**
Not applicable.

◆ **Current status**

Canfor is currently has undertaken a study to determine the relationship between site nitrogen and types and abundance of plant species (Canfor 2001j).

◆ **Forecasting assumptions and analytical methods**

Based on plot data, a gradient from low to high nitrogen concentration will be developed for the FMA area. Plant species will be analyzed for abundance and occurrence along this nitrogen concentration gradient using multivariate statistical techniques. Any species that show significant clustering on a particular area of the nitrogen gradient will be used as an indicator of nitrogen levels.

◆ **Forest management activities**

Information about plant species indicator value for nitrogen concentration will be used to estimate a site's nitrogen level and develop appropriate management strategies. Based on ecological site characteristics, Canfor will select practices that minimize negative impacts to nitrogen cycles, thus maintaining site productivity potential. For example, nitrogen level prediction models could be used to identify productive sites where genetically superior trees would best respond.

◆ **Implementation schedule**

The study to determine the relationship between site nitrogen and types and abundance of plant species will be completed by August 2001. The development of forest management activities based on plant species indicator value for site nitrogen levels will be developed by December 31, 2002.

◆ **Monitoring procedure**

The plant indicator model for site nitrogen level will be tested by comparing a site's predicted nitrogen level with the site's productivity, as measured by site index (height of tree at 50 years breast height). Data for this model validation could come from the temporary sample plot (TSP), permanent sample plot (PSP), or pre-harvest silvicultural prescription (PHSP) data collection programs.

◆ **Linkages between strategic and operational plans**

There is no linkage until the above mentioned study is completed and validated.



(4b) Critical Element

Utilization and rejuvenation are balanced and sustained

(4b) 1. Value

Sustainable yield of timber

(4b) 1.1 Goal

Maintain harvest level related to the AAC as defined in the DFMP

One of the purposes of establishing an annual allowable cut (AAC) is to ensure that the local productive capacity of the forest is not exceeded on a long-term basis (forest sustainability).

(4b) 1.1a. Indicator

The amount harvested versus the approved AAC

It is important to maintain sustainability of the forest by ensuring that the harvested amount does not exceed the annual allowable cut (AAC) and follows the management strategies defined in this DFMP.

(4b) 1.1a.1 Objective

Operational practices meet the DFMP management strategies that make up the AAC

In order to sustain the AAC, operational practices will closely follow the forest management strategies that are stated in this DFMP.

◆ **Acceptable variance**

Any variances identified operationally will be evaluated to ensure the management strategies are still being met.

◆ **Current status**

The following are some of the key components being met from the 1991 DFMP (Canfor 1991), which make up the AAC:

- The amount harvested in relation to 5 year cut control;
- The amount harvested in relation to 5 year cut control on an operational subunit basis;
- The amount harvested in relation to amount of volume available on a township basis;
- Early crop establishment (treat within 2 years of harvest);



- Ecosite classification implementation for silviculture prescriptions;
 - Landscape ecological classification was developed for the FMA area;
 - All harvested areas are surveyed 4 years after treatment;
 - Genetic improved seedlings are being used;
 - High quality seedlings are being used;
 - Timber loss is minimized by establishing windfirm boundaries during cutblock layout; and
 - FMA area was reclassified using AVI inventory standards version 2.1.
- ◆ **Forecasting assumptions and analytical methods**
Not applicable.
- ◆ **Forest management activities**
Incorporate the monitoring of operational practices into the EMS objectives and targets program commencing October 2001.
- ◆ **Implementation schedule**
The implementation schedule for the monitoring of operational practices is defined in this DFMP. The actual program will be applied in the 2002 AOP.

New operational ground rules will be completed within 6 months after the approval of the DFMP.
- ◆ **Monitoring procedure**
A monitoring schedule will be established (as per the Implementation schedule) that ensures management strategies are met.
- ◆ **Linkages between strategic and operational plans**
The strategies outlined in this DFMP will be implemented operationally.

Implementation of this DFMP will be monitored and components will be used as a guide to direct operational planning in order to reduce the transition period for incorporating the new forest management strategies.

(4b) 1.2 Goal

To reforest every hectare harvested

Reforestation of every hectare harvested is a legal responsibility as stated in the *Timber Management Regulations*, Section 123:

“Unless the Minister orders otherwise, a timber licensee or holder of a forest management agreement shall, within 2 years of completing the cut in each area from which coniferous timber has been cut, carry out all treatment necessary to reforest each area to the level required in section 137.”

As stated in “Critical Element 4b, Objective 1.2b.1”, Canfor strives to improve upon the 2 year rule requirement by treating harvested sites within 18 months after the end of the timber year.



In many instances, Canfor exceeds the regulations to ensure that the regenerated stands meet the yields predicted in the 1991 DFMP.

(4b) 1.2a. Indicator

The amount of harvested area in the regenerated yield group

Successful regeneration of harvested sites is fundamental to sustainable forest ecosystems and continued productivity. It is, therefore, essential to make certain that harvested sites are successfully regenerated and are as productive as they are predicted to be in this DFMP.

(4b) 1.2a.1 Objective

To regenerate 100% of the harvested area as per the regenerated yield group as defined in the DFMP

◆ **Acceptable variance**

The acceptable variance is +/-10% of the area of regenerated yield groups and +/-5% of the AAC for C, CD, DC & D, provided that the overall AAC for both coniferous and deciduous are sustained (within – 5%).

◆ **Current status**

The 2000 Pre-harvest Ecological Assessment program, which is fundamental to the silviculture prescription program, is presently incorporating the regeneration strategy as defined in Table 57. Refer to Section F 15.3 for additional information regarding pre-harvest ecological assessment. The 2000 Silviculture AOP has incorporated the regeneration strategy for the 2000-2001 timber year cutblocks. However, the regeneration strategy is still subject to approval by Alberta Sustainable Resource Development, as it forms part of this DFMP.

◆ **Forecasting assumptions and analytical methods**

The following are the key assumptions for the regeneration strategy, all of which have been shown in the past to be reasonably accurate:

- Early crop establishment (within 18 months) will achieve projected breast height ages within the stated times;
- Silviculture treatments successfully put the harvested stand on the growth and yield trajectory of the regenerated yield group;
- Allowances for plantation failures, regeneration delay and understorey protection are accurate; and
- Tree improvement multipliers represent the actual improvement that will occur.

The results of the *Resource and Timber Supply Analysis* have determined the current distribution of regenerated yield groups across the landscape. There are 7 scenarios that will be compared to better understand the relationships among timber supply constraints to the timber supply and regeneration strategy (refer to Appendix 3).



- ◆ **Forest management activities**

The forest management activity is to incorporate the regeneration strategy in the development of regenerated growth and yield tables, which will be used in the resource and timber supply analysis.

- ◆ **Implementation schedule**

All regeneration strategies, plans and activities will follow the strategic direction outlined in this DFMP. This means that harvested sites will be treated using the appropriate techniques for the particular ecosite to ensure that the regenerating stand is on the growth and yield trajectory of the regenerated yield group.

In the interim, some of the strategies developed for this Plan such as the regeneration strategy, are being implemented in anticipation of approval in order to reduce time lags in meeting DFMP objectives.

- ◆ **Monitoring procedure**

The regeneration strategy defined in this DFMP will be compared to planned and actual silviculture activities to ensure compliance to the acceptable variance. If results are below the acceptable variance, over a 5-year period, a review of the effects of such changes on this DFMP will be evaluated. This will be reported in the *Annual Performance Monitoring Report* and the *Five Year Forest Stewardship Report*.

- ◆ **Linkages between strategic and operational plans**

All regeneration strategies, plans and activities will follow the strategic direction outlined in this DFMP.

(4b) 1.2b. Indicator

Total area harvested annually compared to total area reforested (planting or seeding)

All harvested areas are promptly reforested to ensure early crop establishment. Prompt treatment of harvested sites will reduce the lag time between harvest and successful regeneration. This allows the regenerated growth and yield projections to be met, as established in this DFMP.

(4b) 1.2b.1 Objective

All harvested sites are treated within 18 months after the end of the timber year

- ◆ **Acceptable variance**

A level of variance of +3 months is acceptable in order to accommodate the occurrence of fire and periods of extreme weather conditions, including floods and drought. These natural events could delay the treatment of harvested areas.

- ◆ **Current status**

Section 141.1(1) of the *Timber Management Regulation* (Alberta Regulation 60-73) states that reforestation in a cut unit must occur within 2 years after the end of the year of the cut. All harvested areas in the FMA area are properly treated within 18 months after the end of the timber year as of the

1996 timber year (Canfor 2000h), thereby exceeding the Alberta Provincial regulations pertaining to reforestation.

- ◆ **Forecasting assumptions and analytical methods**
No forecasting or analysis is required.
- ◆ **Forest management activities**
Pre-harvest silviculture prescriptions (PHSP) will be assigned to all proposed harvested areas in order to plan silviculture activities in a timely manner to meet the stated objective (refer to "Critical Element 6f, Objective 1.1a.2).
- ◆ **Implementation schedule**
It is currently implemented as of the 1996 timber year.
- ◆ **Monitoring procedure**
All harvested sites will be monitored to ensure that site treatment occurs within 18 months after the end of the timber year in which the cutblock was harvested. Silvicultural records are maintained.
- ◆ **Linkages between strategic and operational plans**
All site treatment strategies will follow the strategic direction outlined in this DFMP.

(4b) 1.3 Goal

Maximize utilization of merchantable wood

A merchantable coniferous tree is defined as follows (Canfor 1994):

- Minimum 15 cm at the stump (measured at 30 cm from the ground) and reaching 4.88 m usable length;
- 11 cm top diameter; and
- At least 50 % sound wood.

A merchantable coniferous log or broken piece contains (Canfor 1994):

- At least 50% usable sound wood; and
- 2.44 meters in length and meets the 11 cm small end diameter.
- Upon approval of the DFMP, the utilization is 15 cm stump diameter and a 10 cm top diameter (refer to Section F 14 regarding utilization standards).

(4b) 1.3a. Indicator

Amount of merchantable wood (m³) left on site

Waste is defined as the volume of merchantable timber (as defined above) left on the harvested area that should have been removed in accordance with the minimum utilization standards set by the regulatory authority.

The amount of wasted merchantable timber varies depending on the experience of the operator, the type of machinery used and the quality of the standing timber.

Waste minimization is an important objective because more of the tree is used and consequently less standing timber may have to be harvested.



(4b) 1.3a.1 Objective

To leave less than 1% of merchantable wood on site

Merchantable wood waste will be evaluated on an operating and FMA area basis.

◆ **Acceptable variance**

The acceptable amount of merchantable wood left on site will not exceed 1%.

◆ **Current status**

Canfor conducted waste surveys from 1994-97 to determine the amount of waste left behind during harvesting operations.

Waste survey results for 1996 and 1997 have shown that Canfor has not exceeded the 1% target by operating area or for the FMA area overall, with an average of 0.37% and 0.42% waste, respectively. This is a significant improvement from the 1994 and 1995 survey results that showed an average of 2.2% and 2.12% waste, respectively (Figure 142).

Surveys ceased after 2 years of excellent results. It was felt that waste minimization efforts were achieving the desired results. The need for surveys has recently been re-evaluated and it was decided to re-initiate the surveys.

◆ **Forecasting assumptions and analytical methods**

Not applicable.

◆ **Forest management activities**

Waste surveys will be conducted within the FMA area to measure merchantable waste left on site. The overall target is not to exceed 1%. If the results show that waste exceeds the overall target in any one operating area, then an evaluation of the logging practices will be done and corrective action implemented.

◆ **Implementation schedule**

Waste surveys will be conducted every 2 years, commencing in 2001.

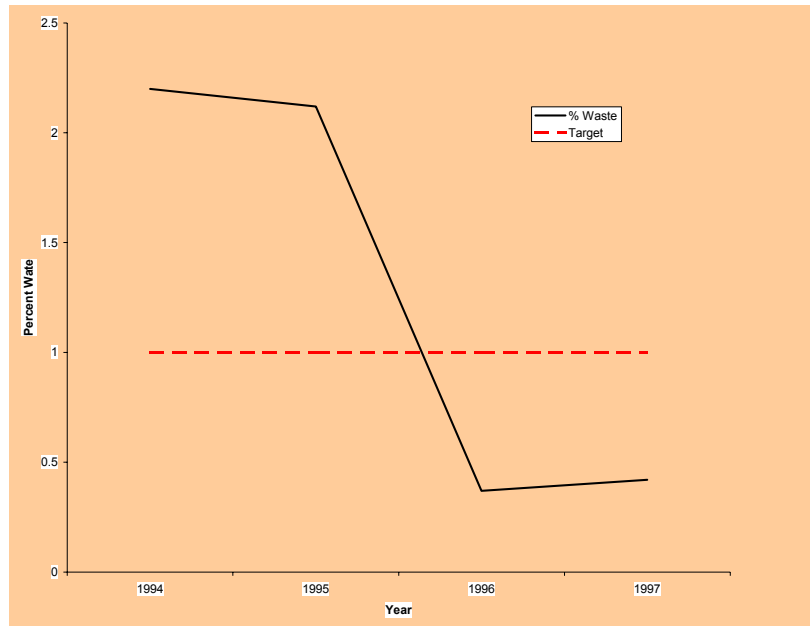
◆ **Monitoring procedure**

Monitoring will be conducted through surveys. Action will be taken if the results show that waste exceeds the acceptable variance.

◆ **Linkages between strategic and operational plans**

Target levels of waste are identified in the AOP and achieved through operational practices



Figure 142. Waste Survey Results (1994–1997)

Source: Canfor's Wood Waste and Residue Survey Results (1994-1997)

(4b) 1.3b. Indicator

Amount of accessible merchantable industrial salvaged wood brought in on an annual basis

Industrial salvaged wood is merchantable coniferous wood removed from various dispositions as described below. Canfor has first right of refusal to purchase salvage wood from within the FMA area by virtue of Forest Management Agreement 9900037.

It is important that all accessible merchantable coniferous salvaged wood is utilized from within the FMA area. It also assists Canfor to offset the loss of timber created by the withdrawal of productive landbase caused by industrial activity.

(4b) 1.3b.1 Objective

To utilize 100% of accessible merchantable industrial salvaged wood from permanent land withdrawals

Roads, wellsites, powerlines, pipelines, recreational sites, campsites and gravel pits are all examples of dispositions that are withdrawn from the landbase by either the forest industry or the oil and gas industry. Many are withdrawn for about 10-20 years; therefore, they are considered permanent.

◆ **Acceptable variance**

The salvaged wood process has an inherent level of variability due to the level of activity and its complexity. It may never be possible to determine if

100% has been salvaged; however, it is desirable to utilize as much as is accessible and known. Some examples of complexity are:

- Salvaged wood may be used by the disposition holder during site construction; and
- Salvaged wood from a number of nearby dispositions may be decked in one location.

◆ **Current status**

Table 62 shows the amount of wood salvaged from the FMA area during the period 1995/1996 to 2000/2001.

Table 62. Amount of Wood Salvaged from the FMA Area

DFMP_Tables.xls
Table 15

Year	2000/2001	1999/2000*	1998/1999	1997/1998	1996/1997	1995/1996
Amount of wood (m ³)	14,480	25,166	10,277	11,494	8,044	14,397
* Volume indicated is higher than average due to the removal of forest cover for the Alliance pipeline project in the FMA area.						

Source: Canfor internal summary of volume delivered from FIRS (Forest Information Resource System)

◆ **Forecasting assumptions and analytical methods**

Canfor will utilize all known salvage wood.

◆ **Forest management activities**

Canfor endeavours to cooperate with other industries so the location and approximate quantity of salvage wood is known.

◆ **Implementation schedule**

Each disposition that is applied for withdrawal from the FMA area receives a signed consent from the Company, as well as a signed salvage commitment form indicating whether the salvaged wood is accepted or declined from that disposition.

The landuse database, which has the records of all dispositions that have been applied for withdrawal, has the capability to track a number of salvage components. In April 2001 Canfor evaluated the role of the database for tracking the number of dispositions with reported salvage wood versus the number of dispositions that had wood hauled to the millsite. The results of this query showed that wood was hauled from 97% of the reported dispositions, thereby showing that the intent of the objective is being met.

◆ **Monitoring procedure**

The amount (m³) of salvaged wood utilized by the Company is currently tracked via Forest Information Resource System (FIRS) database and entered into the landuse database.

◆ **Linkages between strategic and operational plans**

The salvaged wood program is primarily an operational activity.



(4c) Critical Element

Protection of Forest Lands

Forestlands are protected from sustained deforestation or conversion to other uses

(4c) 1. Value

Forests on the landbase

(4c) 1.1 Goal

Maintain forests on the landbase

Canfor helps to minimize the loss of forests on the landbase by managing the amount of permanent roads they construct. Canfor can not control the amount of land lost to other industrial activities. It can, however, work with other industries to promote shared access.

(4c) 1.1a. Indicator

The amount of productive area Canfor utilizes for future permanent roads (LOC)

Permanent roads include both those roads constructed by Canfor and roads constructed by other industries or government. Permanent roads are those roads that are managed through the License of Occupation (LOC).

(4c) 1.1a.1 Objective

To have less than 2% of productive area in Canfor's future permanent roads (LOC)

The total timber harvesting (productive) landbase of the FMA area is 474,193 ha and the acceptable amount of new permanent roads is less than 2% of the productive landbase (9,484 ha).

- ◆ **Acceptable variance**

The acceptable variance is zero.

- ◆ **Current status**

The existing permanent roads in the FMA area do not contribute to the forested landbase. Consequently, they have been part of the net-down for the annual allowable cut (AAC). Only main haul roads are constructed for permanent access and these are managed through the License of Occupation (LOC) disposition process.

The total timber harvesting (productive) landbase of the FMA area is 474,193 ha, the acceptable limit of new permanent roads would therefore, be 9,484 ha. Canfor has constructed or acquired 3 LOCs (equating to 16.22 ha) as follows:



- LOC 930682A (2.5 km) extension was constructed in the Deep Valley operating subunit DN-3;
- LOC 961570 (1.8 km) was acquired from an oil company in operating subunit SIM-3; and
- LOC 003218 (7.0 km) was constructed in operating subunit DN-5. (acquired from Burlington Resources Ltd.).

Refer to Appendix 3 for additional information regarding operating units and subunits.

◆ **Forecasting assumptions and analytical methods**

Not applicable.

◆ **Forest management activities**

All Canfor's future permanent roads will be managed to ensure utility for all parties (integration) and to promote common corridors with other industrial activities, where possible. Thus, all parties must effectively communicate their road building and construction plans.

◆ **Implementation schedule**

All LOCs constructed as of May 1, 1999 are tracked.

◆ **Monitoring procedure**

Canfor will monitor its performance in achieving the objective by tracking the actual and projected amount of Canfor's future permanent roads to be constructed. All newly constructed permanent roads and those permanent roads proposed in the AOP/5 year GDP will be reported in the *Annual Performance Monitoring Report*.

◆ **Linkages between strategic and operational plans**

This objective has been communicated to operational staff to minimize the amount of permanent road construction.

(4c) 1.1b. Indicator

The amount of area in each seral stage at present and key points in time

Seral stage distribution is important for maintaining forests on the landbase because it provides for, over the long-term, a full range of ecosystem types that contribute to the health of the global ecological cycles.

(4c) 1.1b.1 Objective

Maintain seral stages within the natural disturbance regimes at present and key points in time

The target seral stage distribution is one that approximates the expected distribution created by natural disturbance regimes within the 2 Natural regions, Foothills and Boreal Forest (Figure 116). The natural disturbance regime has been modelled by using a theoretical fire-return interval.



◆ **Acceptable variance**

For this planning horizon (200 years), the acceptable variance is to be within the range of the natural disturbance regimes for seral stages in the FMA area and FMUs (G8C, G2C, G5C and E8C), as indicated in Figures 117 to 120, respectively. The acceptable variance represents a combination of both Natural regions where they occur.

Figures 121 and 122, Foothills and Boreal Forest Natural regions, are provided only as supplementary information.

The range of natural disturbance is represented by the solid line in Figures 117 to 122, whereas the bar represents the current or projected distributions.

◆ **Current status**

The area of each seral stage by year in the FMA area, FMUs (G8C, G2C, G5C and E8C) and Natural regions (Foothills and Boreal Forest) is provided in Tables 48 to 53, respectively.

Figures 117 to 120 indicate the present and forecasted distributions for the FMA area and FMUs as compared to expected natural distributions. The observed differences are caused primarily by fire prevention and control and by anthropogenic disturbances.

◆ **Forecasting assumptions and analytical methods**

Seral stage distributions under a natural fire regime were modelled by using a theoretical fire-return interval (ORM 2000). The amount of area in each seral stage in the FMA area and FMUs (G8C, G2C, G5C and E8C) has been forecasted on the landbase at each key point in time (Figures 117 to 120). The key points in time are at years 0, 10, 20, 50, 100 and 200, where 1999 represents year 0. It is assumed these time periods provide a reasonable picture of the variability of seral stage over time.

◆ **Forest management activities**

The amount of each seral stage and its distribution will be compared to the amount of seral stage expected from a theoretical fire-return interval. Adjustments will be made to the harvest schedule, as required, to ensure the desired seral stage distribution is obtained over time.

◆ **Implementation schedule**

Preliminary comparisons between current status and the target seral stages have been completed. All future harvesting plans will follow the strategic direction as outlined in this DFMP and adjusted, as required, to meet the desired seral stages over time.

◆ **Monitoring procedure**

The amount of area of each seral stage that is on the landscape will be compared to the expected natural distributions at key points in time.

◆ **Linkages between strategic and operational plans**

All new harvesting plans will follow the strategic direction as outlined in this DFMP.

(4c) 1.1c. Indicator**The amount of area identified as low productive sites**

Productivity generally refers to the innate capacity of an environment to produce plant and animal biomass. Within forestry, specifically, it is the wood volume or yield that trees can produce within a given period of time. In terms of this DFMP, low productive sites are identified as yield group 13 (SBLT/LTSB (U) - basically black spruce (SB) and larch (LT) stand types) (Canfor 1999h).

(4c) 1.1c.1 Objective**Designate all low productive yield groups as no harvest zones, subject to operational verification**

The yield groups are based on overstorey and understorey tree canopy composition and density, taken from AVI data. Yield tables, evaluating the productivity of each yield group, have been produced. Yield group 13 (SBLT/LTSB (U)) is the only yield group considered to have low productivity and has not been considered in the annual allowable cut (AAC) calculation.

Refer to Section F 8.2.4 for additional information regarding low productive yield groups.

- ◆ **Acceptable variance**
No low productive sites (yield group 13) will be scheduled for harvesting after operational verification.
- ◆ **Current status**
Approximately 30,000 ha were classified as yield group 13. A negligible amount of yield group 13 has been harvested, approximately 16 ha (Canfor 2000).
- ◆ **Forecasting assumptions and analytical methods**
AVI cover type stratification work has been completed and all yield groups identified.
- ◆ **Forest management activities**
Operationally, low productive sites (greater than 1 ha) within cut units are currently identified as per “Critical Element 4c, Objective 1.1c.2” and are not harvested.
- ◆ **Implementation schedule**
Yield group 13 is excluded from the calculation of the AAC.
- ◆ **Monitoring procedure**
Yield group 13 has been identified using AVI and removed from the AAC. Any discrepancies will be recorded in the GIS map database.
- ◆ **Linkages between strategic and operational plans**
The strategies outlined in this DFMP will be followed operationally.

(4c) 1.1c.2 Objective**Delineate all low productive sites (>1 ha) within harvested areas as “no harvest zones”**

Low productive sites take a longer time or never reach an adequate volume to warrant harvesting. These sites are also difficult to reforest and could be lost from the forested landbase if disturbed. Some examples of low productive sites that will be delineated include areas of high or perched water table (typically yield group 13, but could include other stand types).

- ◆ **Acceptable variance**

The acceptable variance is zero regarding harvesting on areas delineated as no harvest zones.

- ◆ **Current status**

No harvest zones are delineated on the 1:5,000 scale block maps during the:

- Planning stage (field reconnaissance or air photo interpretation);
- Layout stage;
- Pre-harvest silviculture prescription program; and
- Block review with the harvesting contractor.

The current status of non-harvested areas in yield group 13 from the past 3 years is:

- 1997 - harvested 2,929.1 ha, of which 26 patches were non-harvested (25.2 ha). Of those 26 patches, only 2 were SB, yield group 13 (1.1 ha);
- 1998 - harvested 2,476.7 ha, of which 53 patches were non-harvested (92.1 ha). Of those 53 patches, 5 were SB yield group 13 (1.9 ha); and
- 1999 proposed (cut over updates not completed) - proposed harvested was 6,215 ha, of which only 5.3 ha were yield group 13. Of this, only 1 patch was greater than 1 hectare.

- ◆ **Forecasting assumptions and analytical methods**

No forecasting or analysis is required.

- ◆ **Forest management activities**

Low productive sites (greater than 1 ha) within cut units are delineated operationally.

- ◆ **Implementation schedule**

Protocols are currently in place for identifying low productive, no harvest zones within proposed harvested areas.

- ◆ **Monitoring procedure**

The annual cutover update program will be used to manage information regarding blocks with no harvest zones.

Representative sample of the harvested areas will be inspected to ensure that identified no harvest zones have remained unharvested, starting in May 2001.

◆ **Linkages between strategic and operational plans**

The operational plan will follow the strategies for low productive stands as stated in this DFMP.

(4c) 1.2 Goal

Productive lands are restored to productive status (excluding cut units)

The intent of this section is to deal with industrial areas, other than cut units, that were once productive and require some additional treatment to restore the areas back to productive status.

Productive lands that are impacted by fire are discussed in the “Critical Element 4c, Objective 1.2a.2”. Catastrophic insect, disease and windfall events are discussed in “Critical Element 2a, Objective 1.1a.1”.

(4c) 1.2a. Indicator

The amount of productive area regenerated (excluding cut units)

(4c) 1.2a.1 Objective

Track amount of previously withdrawn areas brought back into productive status

The types of previously withdrawn areas from the FMA area and brought back into production could include abandoned wellsites, roads, pipelines, campsites and/or gravel pits.

Once those areas are no longer required, they are reclaimed and there is a regulatory process for adding the area back into the FMA area. The concern with most of these areas is that they are currently reclaimed with grass or other vegetative cover, which conflicts with seedling establishment. From a forestry perspective, it would be more efficient to bring those lands back into productive status, providing the site is reclaimed to allow for seedling establishment.

◆ **Acceptable variance**

All areas reforested will be tracked. The acceptable variance is zero.

◆ **Current status**

In 1999, at the request of the Land and Forest Division (LFD), Canfor reforested 5 dispositions. These sites were excellent candidates for reforestation in that:

- Only some sites had been seeded to grass (but not established);
- They were within Canfor’s reforestation program area; and
- They were reclaimed to allow for seedling establishment.

Tracking of previously withdrawn lands commenced in 1999. The silviculture database is the mechanism by which these lands are tracked.



◆ **Forecasting assumptions and analytical methods**

No forecasting or analysis is required.

◆ **Forest management activities**

In order to maximize the future reforestation of withdrawn areas, Canfor and the government will cooperate to identify sites that are best suited for seedling establishment.

These areas will be tracked in a non-liability silviculture database due to different forest management requirements. A separate system for monitoring seedling establishment and growth will be established. Refer to Section F 15.10 for additional information regarding reforestation of wildfires.

◆ **Implementation schedule**

A meeting with LFD was held in August 2000 to discuss implementation of the forest management activity described above. A meeting to review dispositions to be planted will be held annually.

A separate non-liability tracking system utilizing *Microsoft Access*[®] has been established to track the reforestation of burns, wellsites and their associated roads

◆ **Monitoring procedure**

A monitoring system for these areas will be developed by May 1, 2002.

◆ **Linkages between strategic and operational plans**

Tracking and reforestation of withdrawn areas are primarily an operational function, however, once the lands are successfully regenerated, they will play a role in future AAC calculations.

(4c) 1.2a.2 Objective

Track burned areas to ensure that they have been regenerated (with preference to natural regeneration)

Productive forested areas that have been burned need to be returned to productive status. This ensures that the forested landbase does not suffer from sustained deforestation.

Sites will be monitored to ensure they regenerate and the level of stand management required to bring the stand into productive status will be determined.

◆ **Acceptable variance**

The acceptable level of variance is to track regeneration success on fires greater than 4 ha.

◆ **Current status**

Information on burned areas is supplied to the Company by Alberta Sustainable Resource Development.

As reported in the *Forest Protection Plan* (Canfor 2000e), there have been 178 fires in the FMA area during the last 15 years (1986-2000 inclusive), impacting a total of 187.4 ha.



A total of 79 ha of the burned area has been reforested, of which 59 ha was within existing harvested areas and required immediate reforestation in order to meet legal requirements. These areas (that were burned) are currently tracked in the silviculture database.

- ◆ **Forecasting assumptions and analytical methods**
No forecasting or analysis is required.
- ◆ **Forest management activities**
Canfor will continue to keep track of new burned areas.
- ◆ **Implementation schedule**
Protocols have been established to address when reforestation of burned areas are required. Examples of when reforestation efforts would be required include whenever a fire is in a harvested area or an adequate seed source is not available.
- ◆ **Monitoring procedure**
All burned areas greater than 4 ha will be monitored to ensure that the forested landbase does not suffer from sustained deforestation.

Burned areas, greater than 4 ha, that are included in harvested or planned cut units, will continue to be tracked in the silviculture database. Any burned areas that are outside the harvest plans will be removed from the silviculture database and will be tracked in the non-liability Access[®] silviculture database. A separate monitoring program will be developed as per “Critical Element 4c, Objective 1.2a.1”. Refer to Section F 15.10 for additional information regarding reforestation of wildfires.
- ◆ **Linkages between strategic and operational plans**
Fire losses are not considered in the net-down process for the calculation of the annual allowable cut (AAC); however, a catastrophic fire would necessitate a revision.

(4c) 1.3 Goal

Minimize the loss of forest on the landbase due to access

Forestry is only one of many stakeholders that use roads and seismic lines (linear disturbances) as a transportation network. The energy sector constructs cutlines for seismic exploration and these lines are later used for future exploration and as access (roads).

The rate at which these current and future landbase deletions (e.g. seismic lines, wellsites, pipelines and access roads) revegetate to commercial tree species will affect the long-term sustainability of current harvest levels for the forest industry (Stelfox and Wynes 1999). Promoting shared access with other resource users is key to reducing the impact that roads have on the landbase.



(4c) 1.3a. Indicator

Degree of access integration

It is important to promote shared access and integration of operations because it is both cost-effective and environmentally sound.

(4c) 1.3a.1 Objective

To maximize and promote shared access by all resource users

Canfor communicates with other industries operating in the FMA area regarding opportunities for sharing access by:

- Utilizing existing linear disturbances, such as seismic lines, for new roads;
- Utilizing road use agreements as a method to share current road infrastructure; and
- Developing integrated operational plans with other timber users.

◆ **Acceptable variance**

Not applicable.

◆ **Current status**

Currently, Canfor's 5 Year General Development Plan (GDP) map is forwarded to the main industry companies (energy sector and timber) operating within the FMA area, along with an information letter explaining the Company's desire for sharing of access and communicating long-term plans.

The use of seismic lines for access is a common practice. The majority of block roads (temporary roads) constructed by Canfor utilize seismic lines, where appropriate. Main roads utilize seismic corridors, where applicable, as well.

Road use agreements are currently in place with the energy sector as well as other forest companies operating in the area.

Tolko Industries Ltd. and Canfor collaborate during the production of operational plans so that each company is aware of the plans of the other. Efforts are made to ensure that operations are conducted in conjunction with one another. When Ainsworth commences activities within the FMA area, Canfor will co-ordinate activities with them.

◆ **Forecasting assumptions and analytical methods**

Not applicable.

◆ **Forest management activities**

Canfor will develop a communication strategy, as detailed in "Critical Element 3a, Objective 1.1b.1" and convey this strategy to the main industries regarding opportunities for sharing access. However, it must be recognized that Alberta Sustainable Resource Development is responsible for approval of access development for all other industries operating in the FMA area.

◆ **Implementation schedule**

The communication strategy, as stated above, will be developed by December 31, 2001.



◆ **Monitoring procedure**

The communication strategy will be reviewed annually to ensure proper and effective communication flow between stakeholders.

◆ **Linkages between strategic and operational plans**

Industrial plans are reviewed and their impact upon operational plans assessed.

5. Criterion

Multiple Benefits to Society

Forests provide a sustained flow of benefits for current and future generations. Multiple goods and services are provided over the long-term.

(5a) Critical Element

Extraction rates are within the long-term productive capacity of the resource base

(5a) 1. Value

Sustainable yield of timber

(5a) 1.1 Goal

Maintain sustainable harvest levels on the FMA area

The amount of harvest never exceeds, on a long-term basis, the amount that the forest can grow.

(5a) 1.1a. Indicator

Long-term harvest levels vs. actual extraction rates as per the DFMP

The production and delivery of forest products add to the economy through the payment of wages, taxes, profits and other fees such as stumpage fees (CCFM 1997). Thus, maintaining the capacity of the forested landbase is necessary so that it can support a flow of timber and non-timber benefits for current and future generations.

(5a) 1.1a.1 Objective

To harvest at a level less than or equal to the long-term level

The annual allowable cut is calculated to ensure that the local productive capacity of the forest is not exceeded on a long-term basis (sustained yield).

◆ **Acceptable variance**

In any one year, the harvest level can vary as long as the total amount harvested in established 5-year periods (cut control) does not exceed 5% of the total approved annual allowable cut.

◆ **Current status**

The current AAC, as per the 1991 approved DFMP, is 730,000 m³. Presently the Company is harvesting below this level, as indicated in Table 63.



Table 63. Actual Harvested Volume Vs. the AAC

DMP_Tables.xls
Table 16

Cut Control Period	Harvested (m3)	AAC (m3)	Variance (m3)	Variance (%)
1988-1992	3,080,603	3,354,500	273,897	- 8
1993-1997	3,142,717	3,650,000	507,283	-14
Total	6,223,320	7,004,500	781,180	-11

Source: based on 5 year General Development Plan Cut Control Table

- ◆ **Forecasting assumptions and analytical methods**
The assumptions of the approved AAC are provided in Appendix 3.
- ◆ **Forest management activities**
Actual and proposed harvest levels will be monitored to ensure that cut control volumes are met, as established in this DFMP.
- ◆ **Implementation schedule**
The cut control table will be followed, as defined in this DFMP (current practice).
- ◆ **Monitoring procedure**
The extraction rates will be compared to the AAC to ensure the acceptable variance is not exceeded.
- ◆ **Linkages between strategic and operational plans**
A comparison of the cut control volumes will be made to the annual harvested and proposed extraction rates on an annual basis. An adjustment will be made within the 5 year cut control, as required, to ensure the acceptable variance is not exceeded.

(5b) Critical Element

Resource businesses exist within a fair and competitive investment and operating climate

(5b) 1. Value

Economic benefit to local communities

Canfor provides economic and social benefits at the local and provincial level. The FMAC very strongly emphasized that local communities need to benefit from the presence of the FMA area and the activities of the industries that operate in the FMA area. The local communities referred to in this Value are those adjacent to the FMA area: for example, Valleyview, DeBolt, Fox Creek, Spirit River, Fairview, Grande Cache and Grande Prairie.

Refer to Appendix 2 for additional information regarding benefits to local communities.

(5b) 1.1 Goal

Local communities and contractors have the opportunity to share in benefits such as jobs, contracts and services

Canfor strives to hire local contractors and suppliers if they:

- Offer competitive skills;
- Have proper equipment;
- Deliver goods and services at a competitive price; and
- Provide overall service.

It is Canfor's overall strategy to form long-term partnerships with suppliers and contractors to better service the needs of both parties.

Canfor hires contractors in accordance to EMS policy MSP I-04. This policy requires contractors to have the appropriate level of skill and knowledge and to meet all company environmental requirements and other performance requirements.

(5b) 1.1a. Indicator

The economic contribution that Canfor Grande Prairie Operations makes to local communities and contractors

The forestry, agriculture and petroleum industries have played a major role in the economic stability of Northwestern Alberta by providing jobs and contracts. Canfor contributes to the local economy in the form of wages and benefits, property taxes, purchases of goods and services and community support.



(5b) 1.1a.1 Objective**To maintain Canfor's contribution to local communities and contractors**

Canfor's key contributions to the local communities are indicated in Table 64

Table 64. Key Contributions to Local Communities

DMP_Tables.xls
Table 17

Contribution	Amount (\$MM) 2000	Amount (\$MM) 1999	Amount (\$MM) 1998
Property Taxes	0.7	0.6	0.6
Salary and Wages & Benefits	11.6	11.6	10.6
Contract Services Local ¹	24.8	26.8	32.3 (combined) ²
Contract Services Non-local ¹	6.9	2.3	
Supplies	5.0	4.6	4.6
Energy	2.3	2.2	1.9
Stumpage	2.3	10.9	6.8
Community Donations	0.1	0.1	0.1
Total	53.8	59.1	56.9
Notes:			
1. Canfor's accounting ledger currently does not distinguish between local and non-local contractors. However, an estimate of the local versus non-local has been determined, based on preliminary data stratification.			
2. Local plus non-local contract services.			

Source: Canfor accounting ledger

◆ **Acceptable variance**

The acceptable variance is to maintain Canfor's contribution to local communities in relation to the prevailing economic climate.

◆ **Current status**

Table 62 describes the key contributions that Canfor has made from 1998 to 2000.

◆ **Forecasting assumptions and analytical methods**

Contributions to the local communities will be maintained in relation to the prevailing economic climate.

◆ **Forest management activities**

Finalize the data stratification for local versus non-local contractors and suppliers. Develop the spreadsheets necessary to link accounting information with data stratification to facilitate the reporting of contractor and supplier information.

◆ **Implementation schedule**

The above activities are completed.

◆ **Monitoring procedure**

The information contained in Table 64 will be reported in the *Annual Performance Monitoring Report*.



◆ **Linkages between strategic and operational plans**

All woodlands contractors must be hired according to MSP I-04 (EMS policy). This ensures appropriate training is in place prior to performing work in the FMA area.

(5b) 1.1b. Indicator

The financial commitments as stated in Section 33, facility operation and FMA renewal commitments, of the Forest Management Agreement 9900037 are met

The following 2 objectives are from Section 33 of Forest Management Agreement 9900037, signed on May 5, 1999.

(5b) 1.1b.1 Objective

Within 60 months of the signed Forest Management Agreement 9900037, the Company shall upgrade its sawmill and fingerjoint as per Section 33 of the Forest Management Agreement 9900037

“33. (1) The Company shall upgrade its sawmill and fingerjoint plant (the “facilities”) at Grande Prairie, Alberta at a minimum capital cost of \$33 million.

(2) The Company shall complete the upgrade of the facilities under subparagraph (1) within 60 months following the commencement date of this Agreement as follows:

(a) within twenty-four months following the commencement date of this Agreement, the Company shall have expended \$15 million towards the initial upgrade of the facilities; and

(b) within 60 months following the commencement date of this Agreement the Company shall have expended an additional \$15 million towards the upgrade of the facilities.”

◆ **Acceptable variance**

The acceptable variance is zero unless mutually agreed to by both Canfor and Alberta Sustainable Resource Development.

◆ **Current status**

In the fall of 1998, Canfor spent \$3.2 million on a high-speed edger to improve the throughput of logs in the sawmill. In addition, Canfor initiated a \$22 million upgrade to the sawmill at Grande Prairie, commencing in the fall of 1999. The upgrade was completed on May 17, 2000.

Canfor and Canadian Gas and Electric Ltd. (CG&E) have recently initiated a project to use Canfor’s existing wood residue for a cogeneration facility located on Canfor’s Grande Prairie Millsite. Regulatory and environmental permitting has been obtained and construction will commence summer 2001, with completion and commissioning of the facilities scheduled for 2002. This project should meet the requirements of Section 33 (2)(b).



- ◆ **Forecasting assumptions and analytical methods**
Not applicable.
- ◆ **Forest management activities**
Not applicable.
- ◆ **Implementation schedule**
Canfor believes that the commitments in Section 33 (2)(a) and (2)(b) have been met and forwarded a letter to the Minister in that regard. The Minister responded, *"We consider Canfor to be in full compliance with Section 33 (2)(a). Once construction of the Co-Gen facility commences and your investment levels are determined, we are confident you will have achieved full compliance under 33 (2)(b) as well."*
- ◆ **Monitoring procedure**
No monitoring is required. Awaiting the Minister's response.
- ◆ **Linkages between strategic and operational plans**
Not applicable.

(5b) 1.1b.2 Objective

To submit to the Minister for approval, a forestry project, in accordance with Section 33 subparagraph 4 of the Forest Management Agreement 9900037

"(4) No later than the tenth anniversary of the commencement date of this Agreement, the Company shall submit to the Minister a proposal for a forest industry project (the "forest project"), including an implementation timetable, that is acceptable to the Minister."

- ◆ **Acceptable variance**
Zero variance.
- ◆ **Current status**
Canfor submitted a proposal on January 12, 2000 to utilize 170,000 m³ of deciduous from Canfor's FMA area plus an additional volume of 775,000 m³ from other areas that was made available through the North Central Re-Allocation Program process (initiated by the Alberta Government). The proposal included the construction of a \$197 million OSB plant, to be built in the MD of Greenview No. 16 (Canfor 2000b). In February 2000, the timber rights were awarded to Ainsworth Lumber Company Ltd.

Canfor believes that the Cogeneration plant also meets the requirements of Section 33(4) as indicated in the previously mentioned letter to the Minister. The Minister responded, *"A further assessment of the this project [cogeneration plant] will be done at the completion to determine if it might also meet your obligation under Section 33(4)."*
- ◆ **Forecasting assumptions and analytical methods**
Not applicable.
- ◆ **Forest management activities**
Not applicable.



- ◆ **Implementation schedule**
This objective is considered completed.
- ◆ **Monitoring procedure**
Canfor's progress of achieving the objective will be reported in the *Annual Performance Monitoring Report*.
- ◆ **Linkages between strategic and operational plans**
Not applicable.

(5c) Critical Element

Forests provide a mix of market and non-market goods and services

(5c) 1. Value

Multiple benefits from forests

(5c) 1.1 Goal

Maintain the opportunity for others to use the forest for market and non-market goods and services

(5c) 1.1a. Indicator

Amount of coniferous timber available to locals

Forest Management Agreement 9900037 contains provisions for the amount of the conifer volume available. Two objectives will be discussed together in the following text.

(5c) 1.1a.1 Objective

0.5 % of the conifer AAC is made available for local use

As stated in the Forest Management Agreement 9900037, the following volumes are made available for local use:

“8. (2) The minister also reserves the following rights to the timber on the forest management area:..... (d) the right, after consulting with the Company, to issue coniferous timber dispositions from within the forest management area to provide timber for local use in construction and maintenance of public works by any local authority, municipality, county, the Crown in the right of Alberta or Canada and for local residents provided, however, that the total volume of timber cut under authority of such timber dispositions does not exceed 0.5% of the Company’s approved annual allowable cut.”

(5c) 1.1a.2 Objective

Up to a set volume of 10 000 m³ of conifer is available in the FMA area for a Community Timber Use Program

As stated in the Forest Management Agreement 9900037, the following volume of coniferous timber is available for a Community Timber Use Program:

“8. (2) The minister also reserves the following rights to the timber on the forest management area:.....(e) the right, after consulting with the Company, to issue coniferous timber dispositions from within the forest management area to provide timber for a Community Timber



Use Program for up to 10,000 cubic metres of coniferous timber annually.”

- ◆ **Acceptable variance**
The maximum volume available annually cannot be exceeded since this quantity is defined in the Forest Management Agreement 9900037.
- ◆ **Current status**
The local demand for timber, as allocated by Alberta Sustainable Resource Development, is currently met from lands outside the FMA area. During 1998 and 1999, an average of 2 permits per year were issued for Local Timber Permit (LTP) purposes from within the FMA area, totalling 150 m³ (equivalent to 0.02% of the 1991 approved AAC).

The timber available for the Community Timber Use Program has not been required to date.
- ◆ **Forecasting assumptions and analytical methods**
Not applicable.
- ◆ **Forest management activities**
Not applicable because the amount of coniferous timber withdrawn from the AAC is not directly managed by Canfor.
- ◆ **Implementation schedule**
Canfor will work with the Alberta Sustainable Resource Development in assigning areas for the allocation of the timber.
- ◆ **Monitoring procedure**
The amount of coniferous timber extracted through these programs will be tracked as part of the total amount of coniferous timber extracted from the FMA area on an annual basis.
- ◆ **Linkages between strategic and operational plans**
The timber required will be made available within Canfor's operational plans.

(5c) 1.1b. Indicator

Recreational opportunities

There is a need to fully understand the current and future recreational use of the FMA area.

(5c) 1.1b.1 Objective

Complete a recreational assessment within 5 years after the DFMP is approved

The inventory will be broad-based and will include a report on who uses the forest, what general lands are used and for what purpose. Canfor will evaluate future opportunities identified within the boundaries of the FMA area.

- ◆ **Acceptable variance**
Zero variance in respect to completing the assessment within the stated time.



◆ **Current status**

It is recognized there are a variety of current recreational uses within the FMA area, such as campgrounds (4) operated by Canfor and hunting, fishing, canoeing, river boating, trail riding, etc.

Baseline data for recreational activities within the FMA area are not available. Refer to Section C 3.4.1 for additional information regarding recreational assessments.

◆ **Forecasting assumptions and analytical methods**

Not applicable until assessment is completed.

◆ **Forest management activities**

Management strategies for implementation will be developed after the report is completed and evaluated.

◆ **Implementation schedule**

The broad-based inventory will be completed within 5 years after the approval of the DFMP.

◆ **Monitoring procedure**

The status of the survey will be monitored annually to ensure the stated objective is met.

◆ **Linkages between strategic and operational plans**

Known current uses will be incorporated into operational plans, as necessary.

(5c) 1.1b.2 Objective

Ensure 100% of Canfor campgrounds are maintained on the FMA area for the use by the public

Canfor manages 4 campgrounds within the FMA area.

◆ **Acceptable variance**

No campgrounds will be removed.

◆ **Current status**

Four existing campgrounds are managed: MacLeod Flats (formerly Smoky Flats), Economy Lake, Westview Recreation Area and Frying Pan Creek (Canfor 1998c). Refer to Section C 3.4 for additional information regarding recreation areas.

◆ **Forecasting assumptions and analytical methods**

Not applicable.

◆ **Forest management activities**

Not applicable.

◆ **Implementation schedule**

Completed.

◆ **Monitoring procedure**

Campgrounds are maintained for the use of the public.

◆ **Linkages between strategic and operational plans**

Not applicable.



(5c) 1.1b.3 Objective
Promote Canfor campgrounds to the public

- ◆ **Acceptable variance**
Not applicable.
- ◆ **Current status**
Canfor has produced a brochure of public campsites (including mapped locations and description of facilities) in the FMA area (Canfor 1998c) and has distributed it to the Muskoseepi Park office, Rotary bus tours and the Grande Prairie Regional Tourism Association. Copies are also available at the Canfor Woodlands office in Grande Prairie.

The Rotary bus tour co-ordinator receives approximately 1,000 brochures for the annual summer bus tour program.
- ◆ **Forecasting assumptions and analytical methods**
Not applicable.
- ◆ **Forest management activities**
Not applicable.
- ◆ **Implementation schedule**
Expand circulation of the brochure, as required.
- ◆ **Monitoring procedure**
Canfor will maintain a list of where brochures were distributed (Canfor 2000c: Tab "brochure").
- ◆ **Linkages between strategic and operational plans**
Not applicable.

(5c) 1.1c. Indicator
Communication with trappers impacted by harvest operations

Canfor, in consultation with the Alberta Trappers Association and the Sturgeon Lake Cree Nation, has developed a *Trappers Notification Program* (Canfor 2001). This program was reviewed with the FMAC.

(5c) 1.1c.1 Objective
Contact all trappers directly impacted by harvest operations

- ◆ **Acceptable variance**
Zero variance, providing that a reasonable effort at contact is made.
- ◆ **Current status**
The *Trappers Notification Program* was implemented for the 1998 season. The plan defines compensation criteria, as well as other actions. It specifies personal contacts to be made with the trappers concerning:
 - Cabin, trapline and important wildlife areas;



- When and where harvesting, road building, log hauling and silviculture activities will occur; and
- Exact locations of cutblocks and logging roads.

Canfor maintains a current list of all senior trappers within the FMA area.

Implementation of the direct communication is accomplished by hiring a person as per Section 1.3 of the *Trappers Notification Program*. Contacts are documented using the Trappers' Notification form.

Currently, a reasonable effort is made to contact all trappers affected within the first 1-3 years of the AOP/5 year GDP by September 30 each year, for example:

- In 1998, 15 of the 17 trappers affected by 1998 harvesting operations were notified; however, the 2 remaining trappers were notified in 1997.
 - In 1999, 12 of the 15 trappers affected by 1999 harvesting operations were notified; however, one of the 3 were notified in 1998 and the other 2 have no record on file of being contacted. In addition in 1999, for the 2000 harvest operations, 12 of the 14 were given notification.
- ◆ **Forecasting assumptions and analytical methods**
Not applicable.
 - ◆ **Forest management activities**
The *Trappers Notification Program* was revised June 30, 2000. A Trappers notification tracking system database is used to monitor conformance to the program. Comments made by the trappers are tracked in the ITS public comments database, as per the EMS MSP I-03 - Public Communication.
 - ◆ **Implementation schedule**
Annual notifications will be conducted in the summer.
 - ◆ **Monitoring procedure**
Monitoring of trapper notifications will be through the database, as indicated in the Forest management activities.
 - ◆ **Linkages between strategic and operational plans**
Registered traplines, as indicated in Section C 3.1 are referenced to the current harvest planning activities. The affected trappers are notified according to the *Trappers Notification Program*.

(5c) 1.1d. Indicator
Communication with outfitters impacted by harvest operations

(5c) 1.1d.1 Objective
Contact all outfitters directly impacted by harvest operations

- ◆ **Acceptable variance**
Zero variance in respect to contacting affected outfitters.



◆ **Current status**

As a first step to achieving this objective, Canfor obtained a list of outfitters from the Alberta Professional Outfitters Society indicating that there are 29 Professional Outfitters operating in the FMA area, as of September 2000. A letter was then forwarded to individual outfitters requesting information regarding their operating area and the type of information that they desire to receive from Canfor. Outfitters were also invited to Canfor's forestry open house to provide input into operational plans. Outfitters will receive the 5 year General Development Plan map (GDP) on an annual basis. Canfor's intent is to work with the outfitters and incorporate their concerns as they arise. Refer to Section C 3.2 for additional information regarding outfitters.

◆ **Forecasting assumptions and analytical methods**

Not applicable.

◆ **Forest management activities**

Input received from the outfitters will be incorporated, as warranted, into Canfor's harvest planning.

◆ **Implementation schedule**

Contact with the Outfitters has been initiated, as per the Current status.

◆ **Monitoring procedure**

Canfor will keep a record of all letters sent and responses received will be indicated in the Annual Operating Plan.

◆ **Linkages between strategic and operational plans**

The Outfitters, as indicated in the Section C 3.2, are referenced to the current harvest planning activities. The affected outfitters receive the GDP map annually.

(5c) 1.2 Goal

Improve the value of raw timber material from the FMA area

(5c) 1.2a. Indicator

To increase lumber recovery from the conifer timber resource during the milling process

Increasing the lumber recovery factor (LRF) results in better utilization of the timber resource (i.e. mill production will increase utilizing the same volume of logs).

(5c) 1.2a.1 Objective

To increase lumber recovery by 14% at the millsite

◆ **Acceptable variance**

The acceptable variance to the increase in LRF of 14% is zero. The timeframe in which to achieve the 14% is between 3 and 6 months after the May target date.



◆ **Current status**

A \$22 million upgrade to the mill is now completed. The lumber recovery factor (LRF) prior to the upgrade was 235 fbm/m³. The LRF (as of April 2001) is 278 fbm/m³, representing an increase of 14.55%. This modernization has increased the yearly mill output from 175 MM board feet to 200 MM board feet, utilizing the same volume of logs.

◆ **Forecasting assumptions and analytical methods**

Logs with sweep are now curved sawn, which results in higher lumber recovery and increased grade outturn.

◆ **Forest management activities**

Not applicable.

◆ **Implementation schedule**

The mill upgrade was completed on May 17, 2000.

◆ **Monitoring procedure**

The log profiles will be monitored in relation to the recovery rate of the mill. If the log profile is different than forecasted, the recovery rate will be compared to what the previous rate would have been prior to the mill upgrade, in order to get a fair comparison.

◆ **Linkages between strategic and operational plans**

Not applicable.



6. Criterion

Accepting Society's Responsibility for Sustainable Development

Society's responsibility for sustainable forest management requires that fair, equitable, and effective forest management decisions are made.

"... fairness is defined in terms of inclusiveness, while an effective decision is one that incorporates and mediates the broad spectrum of concerns on a given issue." (CCFM 1997: p. 112)

(6a) Critical Element

Forest Management

Forests are managed in ways that reflect social values, and management is responsive to changes in those values.

(6a) 1. Value Social values

(6a) 1.1 Goal To be responsive to the social values identified by the FMAC and other publics

(6a) 1.1a. Indicator Topics in the current Issue List (compiled by the FMAC since inception) are addressed by the Company to the Committee's satisfaction

The Forest Management Advisory Committee was formed in 1995 as a public consultation initiative by Canfor as a way to include public input into the Detailed Forest Management Plan. The *Issues List* has been developed during the past 5 years. The list is a "living document", which means all new issues are incorporated as they are raised. Canfor takes responsibility for ensuring that all issues are addressed to the Committee's satisfaction.



(6a) 1.1a.1 Objective

100% of the topics in the Issue List, as of June 30, 2000, are addressed to the Committee's satisfaction by the submission date of the DFMP

Issues raised after June 30, 2000 will still be tracked and addressed in the *Issues List* (Forest Management Advisory Committee 1995); however, Canfor may not be able to completely address those issues to the Committee's satisfaction, due to time constraints.

Refer to Appendix 4 for the *Issues List*.

- ◆ **Acceptable variance**
To address 90% of the topics to the Committee's satisfaction is acceptable.
- ◆ **Current status**
The *Issues List* was initiated in 1995 and is a "living" document. It is updated as an issue's status changes or as new issues are raised. The Committee approves all revisions.
- ◆ **Forecasting assumptions and analytical methods**
The *Issues List* will be maintained for the life of the Committee.
- ◆ **Forest management activities**
Not applicable.
- ◆ **Implementation schedule**
Issues are addressed by Canfor as they are added to the *Issues List*.
- ◆ **Monitoring procedure**
The existing *Issues List* (matrix) was utilized, to track the status of each issue (e.g., some of the categories that could be included are "incorporated into the DFMP", "not addressed" and "addressed outside of DFMP"). The FMAC was consulted Dec 2000, regarding the effectiveness of the proposed monitoring system.
- ◆ **Linkages between strategic and operational plans**
The *Issues List* is incorporated into this DFMP. Operational procedures may be modified to address FMAC issues.

(6a) 1.1b. Indicator

The number of Canfor responses to written letters or public meeting issues, etc.

Canfor recognizes the right of the public to provide input. The process used to address public input is stated in the *Public Involvement Program* (Canfor 2001b) and the Environmental Management System (EMS).



(6a) 1.1b.1 Objective
100% of public issues received after November 1999 are responded to by Canfor

Canfor's Environmental Management System was registered in November 1999. Therefore, that is the date at which Canfor committed to a tracking process for public input external to the FMAC process. It should be noted that letters received prior to November 1999 received a response. However, Canfor's tracking system was not in place at that time. Letters and responses were kept on file.

The FMAC process tracks Committee input via the Issues List discussed in "Critical Element 6a, Objective 1.1a.1".

- ◆ **Acceptable variance**
Zero variance.
- ◆ **Current status**
A computerized Incident Tracking System (ITS) has been developed for tracking public issues. For the period 2001 year-to-date there are a total of seven entries:
 - One comment regarding a positive experience at Swan Lake Recreational Area;
 - Five relate to Canfor's log haul; and
 - One relates to the Cogeneration plant remote storage site north of the city.
- ◆ **Forecasting assumptions and analytical methods**
Not applicable.
- ◆ **Forest management activities**
Activities are dependent on the issues raised.
- ◆ **Implementation schedule**
The Incident Tracking System (ITS) has been implemented as of November 1999. Issues must be documented as per the EMS guidelines and submitted to the EMS representative for entry into the ITS.
- ◆ **Monitoring procedure**
Public input will be reported and responses documented, as they occur. ITS makes provisions for monitoring the progress of required action plans.
- ◆ **Linkages between strategic and operational plans**
Operational procedures may be modified to address public issues.



(6b) Critical Element

Duly established Aboriginal and treaty rights are respected

(6b) 1. Value

Understand and respect treaty and Aboriginal rights

(6b) 1.1 Goal

Avoid infringement of treaty and Aboriginal rights

(6b) 1.1a. Indicator

Amount of opportunity for input by Aboriginal peoples

The most effective spokespersons for Aboriginal rights are members of the Aboriginal communities. Therefore, the most effective way to both understand and avoid infringement of treaty and Aboriginal rights is to provide a mechanism whereby Aboriginal people can most easily provide input to Canfor.

(6b) 1.1a.1 Objective

To provide increased opportunities for input

◆ **Acceptable variance**

Zero variance with regard to Canfor initiating a meeting to develop an improved mechanism for increasing input opportunities.

◆ **Current status**

The current mechanism for providing input to Canfor has been through the Forest Management Advisory Committee (FMAC). Sturgeon Lake Cree Nation and Metis Nation of Alberta, Local 1990 have been members of the FMAC since inception (1995). As of April 2001, the Metis Nation of Alberta, Local 1990 has been represented by the Zone 6 Metis Nation of Alberta. Therefore, both groups have had opportunity to provide input regarding forest management activities that may impact treaty and Aboriginal rights.

Commencing in March 2000, Canfor has had frequent independent meetings with the Sturgeon Lake Cree Nation to provide their input to the CSA Matrix (Appendix 7).

On April 20, 2000 and May 12, 2000 Canfor representatives met with Sturgeon Lake Cree Nation Band representatives to discuss issues of mutual interest. Discussions related to increased opportunity for input into forest planning included the use of traditional knowledge, as noted in the draft strategic plan discussion paper presented at the May 12, 2000 meeting.



In May 2001, Canfor met with the Zone 6 Metis Nation of Alberta representative. The meeting focused on understanding the mandate and objectives of the Zone 6 Metis Nation

Refer to Section E 5.3.6 for additional information regarding Aboriginal involvement.

- ◆ **Forecasting assumptions and analytical methods**
Not applicable.
- ◆ **Forest management activities**
Changes to forest management activities, as a result of Aboriginal input, will be documented.
- ◆ **Implementation schedule**
The draft strategic plan has been presented to the Sturgeon Lake Cree Nation and Canfor is awaiting input. Additional meetings are scheduled; with a goal of completing the plan by the revised date of December 2002.
It is Canfor's intention to continue its dialogue with the Zone 6 Metis Nation.
- ◆ **Monitoring procedure**
Monitoring of action items, in relation to input received from Aboriginal people regarding forest management activities, will be tracked in the ITS database. Correspondence, feedback, responses and other pertinent documents will be kept on file.
- ◆ **Linkages between strategic and operational plans**
If Aboriginal input leads to changes in operational procedures, details will be specified in the operating plans.

(6b) 1.1a.2 Objective

To be responsive to aboriginal input

The improved mechanism(s), as discussed in the previous objective, will include provisions for how and in what timeframe Canfor will respond to input received from Sturgeon Lake Cree Nation and Zone 6 Metis Nation of Alberta.

- ◆ **Acceptable variance**
Zero variance with regard to Canfor's following the agreed to mechanism of response.
- ◆ **Current status**
Canfor has historically met with Sturgeon Lake Cree Nation on an informal basis as issues arise, in addition to their participation on the FMAC. On April 20, 2000 and May 12, 2000, Canfor representatives met with Sturgeon Lake Cree Nation Band representatives to discuss issues of mutual interest. Discussions occurred regarding communication processes (responding to input), as noted in the draft outline of the strategic plan discussion paper presented at the April 20, 2000 meeting.

The Zone 6 Metis Nation of Alberta, is an active participant on the FMAC. As a result of the initial meeting with the Zone 6 Metis Nation of Alberta, Canfor is evaluating the information received to determine the next step.



Refer to Section E 5.3.6 for additional information regarding Aboriginal involvement.

- ◆ **Forecasting assumptions and analytical methods**
Not applicable.
- ◆ **Forest management activities**
Changes to forest management activities, as a result of Aboriginal input, will be documented.
- ◆ **Implementation schedule**
The draft strategic plan has been presented to the Sturgeon Lake Cree Nation and Canfor is awaiting input. Additional meetings are scheduled; with a goal of completing the plan by the revised date of December 2002.

It is Canfor's intention to continue its dialogue with the Zone 6 Metis Nation.
- ◆ **Monitoring procedure**
Monitoring of action items in relation to input received from Aboriginal people will be tracked in the ITS database. Correspondence, feedback, responses and other pertinent documents will be kept on file.
- ◆ **Linkages between strategic and operational plans**
If Aboriginal input leads to changes in forest management activities, details will be specified in the operating plans.



(6c) Critical Element

The special and unique needs of Aboriginal peoples are respected and accommodated in forest management decisions

(6c) 1. Value

Understand and respect Aboriginal special needs

(6c) 1.1 Goal

Effective consultation with Aboriginals

(6c) 1.1a. Indicator

Early consultation prior to decisions being made

Early consultation will ensure that planning is sensitive to Aboriginal issues in a proactive way rather than in a reactive way.

(6c) 1.1a.1 Objective

To develop and implement early consultation

The improved mechanism, as discussed in the previous objectives, will include provisions for early consultation with Sturgeon Lake Cree Nation and Zone 6 Metis Nation of Alberta.

- ◆ **Acceptable variance**

Zero variance with regard to implementing an early consultation process (improved mechanism for input).

- ◆ **Current status**

The FMAC is the current primary mechanism for providing information, in a timely manner, to the 2 groups. Sturgeon Lake Cree Nation and Zone 6 Metis Nation of Alberta, are active members of the FMAC. Therefore, they have had opportunity to provide input regarding forest management activities that may impact treaty and Aboriginal rights.

In addition to the FMAC, Canfor provides all trappers information regarding operational plans as much as 5 years in advance in order to ensure early consultation. Refer Section C 3.1 for additional information regarding trappers.

On April 20, 2000 and May 12, 2000, Canfor representatives met with Sturgeon Lake Cree Nation Band representatives to discuss issues of mutual interest. Discussions occurred regarding communication processes (early consultation), as noted in the draft outline of the strategic plan discussion paper presented at the April 20, 2000 meeting.



- ◆ **Forecasting assumptions and analytical methods**
Not applicable.
- ◆ **Forest management activities**
Changes to forest management activities, as a result of Aboriginal input, will be documented.
- ◆ **Implementation schedule**
The draft strategic plan has been presented to the Sturgeon Lake Cree Nation and Canfor is awaiting input. Additional meetings are scheduled; with a goal of completing the plan by the revised date of December 2002.

It is Canfor's intention to continue its dialogue with the Zone 6 Metis Nation.

Refer to Section E 5.6.3 for additional information regarding Aboriginal involvement.
- ◆ **Monitoring procedure**
Action items, in relation to input received from Aboriginal people, will be monitored (tracked) in the ITS database. Correspondence, feedback, responses and other pertinent documents will be kept on file.
- ◆ **Linkages between strategic and operational plans**
If Aboriginal input leads to changes in forest management activities, details will be specified in the operating plans.

(6c) 1.2 Goal

To be open to the development of partnerships and working arrangements with Aboriginals that are based on good, sound business practices and are mutually beneficial

(6c) 1.2a. Indicator

Employment and business opportunities

(6c) 1.2a.1 Objective

To identify present and future employment and business opportunities

Canfor intends to work with both Sturgeon Lake Cree Nation and the Zone 6 Metis Nation of Alberta, to develop individualized frameworks for working together. Key interests or areas of concern need to be identified by all parties. Identification of key issues is one of the primary tasks. Those issues that provide mutual benefits, are appropriate and are desirable to address or resolve, will be included in those plans.

- ◆ **Acceptable variance**
The acceptable variance is zero with respect to the initiation of individualized frameworks for working together.



◆ **Current status**

Canfor has a history of working with Aboriginal people to provide employment and contract opportunities. The Company continues its association with Aboriginal people by directly hiring, or providing funding for, initiatives such as stand tending contracts, ground application of herbicide, specific stand-by Fire crews, Adult Vocational Center (AVC) training and Trappers Notification Program.

On April 20, 2000, Canfor initiated dialog with Sturgeon Lake Cree Nation regarding development of a 5-year strategic business plan (Canfor 2000d). After the initial meeting, Sturgeon Lake Cree Nation requested that Canfor develop and submit a draft strategic business plan to the Band Council for consideration. Development of this plan is progressing. Once completed, approval is required at the Canfor corporate level, as well as the Band Council level.

Refer to Section E 5.3.6.3 for additional information on Aboriginal business relationships.

◆ **Forecasting assumptions and analytical methods**

Not applicable.

◆ **Forest management activities**

See current status.

◆ **Implementation schedule**

The draft strategic plan has been presented to the Sturgeon Lake Cree Nation and Canfor is awaiting input. Additional meetings are scheduled; with a goal of completing the plan by the revised date of December 2002.

It is Canfor's intention to continue its dialogue with the Zone 6 Metis Nation.

◆ **Monitoring procedure**

Correspondence, feedback, responses and other pertinent documents will be kept on file.

◆ **Linkages between strategic and operational plans**

If required, operational plans will be modified, based on Aboriginal input.

(6c) 1.3 Goal

Respect special cultural and historic sites

(6c) 1.3a. Indicator

Location of special cultural and historic sites

The location of these sites is confidential and, therefore, no mapping can be provided.



(6c) 1.3a.1 Objective

Re-assess the status of the existing archaeological and historical overview assessment that was completed on the FMA area and update, if necessary

An Archaeological and Historical Overview Assessment (Altamira Consulting Ltd. 1998) was completed, which used literature reviews and topographic features, to assess the likelihood for locations to have archaeological potential (eight sites are located within the FMA area). No field inspections were conducted.

◆ **Acceptable variance**

Zero variance in regards to conducting a re-assessment of the report.

◆ **Current status**

The report has been re-assessed and plans have been developed to conduct heritage evaluations.

The plan consists of 2 stages:

1. Utilize a manual heritage evaluation for assessing harvesting, road building and silviculture plans with regards to the heritage resource potential within the FMA area. This approach will be used until a heritage management model is fully functional in March 2002; and
2. Implementation of an Alberta Community Development approved heritage management model to determine the heritage resource potential within the FMA area.

In addition, Canfor has actively sought input from Aboriginal people to help identify special cultural and historic sites.

◆ **Forecasting assumptions and analytical methods**

Not applicable at this time.

◆ **Forest management activities**

The activity is to implement the plan described under Current status and provide staff training in the application of the model.

◆ **Implementation schedule**

The resource management model will be fully functional by March 2002.

◆ **Monitoring procedure**

Documentation regarding known sites will be kept on file and will remain strictly confidential.

◆ **Linkages between strategic and operational plans**

All identified special cultural and historic sites will be buffered. Operational procedures may be modified to decrease the likelihood of accidental disturbance of currently unknown sites.



(6d) Critical Element

The decision-making process is developed with input from directly affected and local interested parties

(6d) 1 Value Public input

(6d) 1.1 Goal To proactively involve directly affected and local interested parties in the development of the decision-making process

(6d) 1.1a. Indicator Approved terms of reference for the FMAC

(6d) 1.1a.1 Objective To conduct the activities of the FMAC according to the Terms of Reference

The FMAC Terms of Reference Section B: Defined Goals (Canfor 2001h: p. 4) states that the FMAC will:

- "1) Provide input and revise, when necessary, on:
 - a) values, goals and indicators and objectives;
 - b) design of Sustainable Forest Management (SFM) system, monitoring system and evaluation process; and
 - c) forecasting used in the development of the SFM Plan.*
- 2) Review performance evaluations and recommendations for improvement;*
- 3) Develop communication strategy to provide feedback to interested parties about the defined forest area, particularly the results of performance evaluations related to the critical elements of the Canadian Council Forest Ministers (CCFM) Criteria; and*
- 4) Annually provide advice on mechanisms or methods to improve communication and effective input in the SFM revision process."*

- ◆ **Acceptable variance**
Zero variance to the above activities (defined goals).
- ◆ **Current status**
See above text under the objective.
- ◆ **Forecasting assumptions and analytical methods**
Not applicable.

◆ **Forest management activities**

Not applicable.

◆ **Implementation schedule**

The following points (Canfor 2001h: p. 5) summarize approximate key dates for the preparation of this Detailed Forest Management Plan (DFMP) and CSA Certification. These dates are guidelines and other issues may cause a delay or acceleration of the proposed dates (e.g. the bullet has a proposed date of December 2000, however, due to circumstances, has been postponed to July 30, 2001)

- Continue monthly meetings Year 2000;
- Initiate Public Group Meeting for CSA Certification January, 2000;
- Complete pre-audit input April, 2000;
- Complete input for Timber Supply Analysis Mid-2000;
- Post-audit review update September 2000; and
- Submit Detailed Forest Management Plan December 2000.

In addition, the FMAC will continue to meet semi-annually (or more, as necessary) after submission of the DFMP. The purpose of the meetings will be to provide continued input regarding forest management practices and to conduct an annual Sustainable Forest Management Plan (SFMP) review.

◆ **Monitoring procedure**

The Terms of Reference will be reviewed annually with the FMAC.

◆ **Linkages between strategic and operational plans**

Future feedback from the FMAC may result in changes to operational plans.

(6e) Critical Element

Decisions are made as a result of informed, inclusive, and fair consultation with people who have an interest in forest management or are affected by forest management decisions

(6e) 1. Value

Informed and enlightened public

(6e) 1.1 Goal

To provide information regarding forest management practices to the public

The document titled, “A *Public Involvement Program for Canadian Forest Products Ltd.’s Forest Management Agreement 9900037*” (Canfor 2001b) describes the main principles and initiatives that Canfor is implementing to inform the public and solicit public feedback, including the maintenance of a stakeholder list for communication purposes.

(6e) 1.1a. Indicator

A report on Canfor’s forest management practices

(6e) 1.1a.1 Objective

To provide an annual report to the public on Canfor’s forest management practices

The *Annual Public Report* will be completed by summarizing the Company’s performance and forest management activities from the *Annual Performance Monitoring Report*. The content and date of submission for the *Annual Performance Monitoring Report* will be described in this DFMP.

◆ **Acceptable variance**

The *Annual Public Report* will be available for public review within 2 months after the submission of the *Annual Performance Monitoring Report*.

◆ **Current status**

The first *Annual Performance Monitoring Report* will be completed by September 2001.

◆ **Forecasting assumptions and analytical methods**

Not applicable.

◆ **Forest management activities**

Not applicable.



◆ **Implementation schedule**

The draft outline of the *Annual Performance Monitoring Report* will be prepared by a revised date of September 1, 2001 and submitted by September 30, 2001, with the *CSA Annual Progress Report* as a component.

◆ **Monitoring procedure**

The monitoring function is inherent in the above reports.

◆ **Linkages between strategic and operational plans**

Not applicable.

(6e) **1.1b. Indicator**

Copies of DFMP, AOP/5 Year GDP and Sustainable Forest Management Plan (SFMP) are available at local public libraries

(6e) **1.1b.1 Objective**

To provide copies of the DFMP, AOP/5 Year GDP and Sustainable Forest Management Plan (SFMP) to all public libraries in the local area

The libraries to receive copies are located in Grande Prairie, DeBolt, Valleyview, Spirit River and Grande Cache.

◆ **Acceptable variance**

The acceptable variance is zero.

◆ **Current status**

The 1991 approved DFMP is in the Grande Prairie library. The AOP/5 year GDPs (since 1999) and the Sustainable Forest Management Plan (July 2000) are in the Grande Prairie, Spirit River, DeBolt, Grande Cache and Valleyview libraries.

◆ **Forecasting assumptions and analytical methods**

Not applicable.

◆ **Forest management activities**

Not applicable.

◆ **Implementation schedule**

The AOP/5 year GDP will be submitted to the libraries within 2 months of submission to the Alberta Sustainable Resource Development.

The DFMP will be submitted to the libraries within 2 months after approval from the Alberta Sustainable Resource Development.

◆ **Monitoring procedure**

Correspondence regarding the above submissions is kept on file.

◆ **Linkages between strategic and operational plans**

Not applicable.

(6e) 1.1c. Indicator

Amount of elementary, secondary and post-secondary school-based forest educational opportunities supported by Canfor

(6e) 1.1c.1 Objective

To participate in at least 5 different types of educational opportunities

The following are examples of educational opportunities in which Canfor has participated in past years

- Support of Forest Resource Educator position;
- National Forestry week activities (Walk Through the Forest, Arbor day);
- Northern Alberta Forestry show (trade show held every other year);
- Elementary or secondary classroom presentations (as requested from the forest educator);
- Presentations to special interest groups (varies based on requests);
- Mentor program with Grande Prairie Regional College (GPRC) (work experience for students); and
- Presentations to GPRC forestry classes (as requested).

◆ **Acceptable variance**

Zero variance on an annual basis.

◆ **Current status**

Canfor has participated in all the examples listed above (Canfor 2000c: Tab “educational opportunities”). The Forest Resource Educator tracks presentations to the classroom. National Forestry Week activities are kept on file as is trade show participation and presentations made to GPRC forestry classes. Canfor has participated in the Mentor program since the inception (September 1998) of the forestry program at GPRC. Presentations made to special interest groups may or may not be kept on file and some are listed in the Forest Resource Educator’s summary report.

◆ **Forecasting assumptions and analytical methods**

Not applicable.

◆ **Forest management activities**

Not applicable.

◆ **Implementation schedule**

The Forest Resource Educator is supported currently as a 5-year program, which is due for renewal July 1, 2002. There has been agreement by all partners to renew the position on a 3-year contract basis.

The GPRC Mentor program occurs during the school term (September to December and/or January to March).

National Forestry Week activities occur during the first full week in May.



The Northern Alberta Forestry show occurs during National forestry Week in the odd numbered years.

The remainder do not have time frames and are completed on an “as needed” basis.

◆ **Monitoring procedure**

The educational opportunities that Canfor has participated in will be reported in the *Annual Performance Monitoring Report*.

◆ **Linkages between strategic and operational plans**

Not applicable.

(6e) 1.1d. Indicator

Use of experts (i.e. herbicide guest lecture, wildlife biologists, ecological task force, etc.) to increase knowledge and understanding of forest ecosystems for the FMAC

(6e) 1.1d.1 Objective

Utilize the information provided by experts to increase knowledge and understanding of forest ecosystems for the FMAC

◆ **Acceptable variance**

Not applicable.

◆ **Current status**

Canfor has regularly brought in experts to explain some of the more technical aspects of forest ecosystems. In addition, field tours were offered to show the field application of the practices discussed at the meetings. The following is a summary of the presentations and field tours offered:

- April 1996: Joint meeting with Forest Ecosystem Management Task Force (Government perspective of public involvement and its importance as well as a university professor’s discussion of old growth);
- July 1996: FMAC field tour: stand tending and herbicide sites;
- April 1997: Presentation from Warren Eastland (caribou expert) and Paul Hvengaard (bull trout expert);
- May 1997: Two members attended the ecosystem management workshops held at the GPRC;
- June 1997: Member attended the ForestCare audit and reported back to the Committee at the September meeting;
- July 1997: Fish shocking and bridge construction field tour;
- September 1997: Two members attend forest industry reverse trade fair;
- October 1997: Joint meeting with Forest Ecosystem Management Task Force;



- December 1997: Article on ecosystem management by Dr. Dan Gilmore handed out;
 - February 1999: Sustaining the boreal forest conference in Edmonton - 1 or 2 members attended;
 - October 1999: Randy Webb presentation on resource and timber supply analysis;
 - December 1999: Paul Wooding and Mike Alexander discussed forest management certification programs;
 - May 2000, October 2000, etc.: Randy Webb presentation resource and timber supply analysis; and.
 - November 2000: Herbicide information session held in Valleyview.
- ◆ **Forecasting assumptions and analytical methods**
Not applicable.
 - ◆ **Forest management activities**
Not applicable.
 - ◆ **Implementation schedule**
On an “as needed” basis.
 - ◆ **Monitoring procedure**
The documentation of experts advising the FMAC is contained in the FMAC minutes.
 - ◆ **Linkages between strategic and operational plans**
Not applicable.

(6e) 2. Value

Informed company

Informed company means that the company is aware of public issues.

(6e) 2.1 Goal

To obtain public input on forest management practices using an open, transparent and accountable process

(6e) 2.1a. Indicator

Amount of different types of public involvement opportunities that have been incorporated into the Company's planning as per the Public Involvement Program

The *Public Involvement Program* (Canfor 2001b) contains the following different types of public involvement:

- Forest Management Advisory Committee;
- Public meetings, e.g.;
 - AOP open house;
 - Townhall meetings; and
 - Herbicide public meetings as required.
- Written submissions;
- Annual trapper notifications;
- Outfitters notification; and
- Field tours.

Refer to Section E 5.3 for additional information regarding the Public Involvement Program.

(6e) 2.1a.1 Objective

To incorporate at least 4 different types of public involvement opportunities into the Company's planning activities on an annual basis

- ◆ **Acceptable variance**
The acceptable variance is zero.
- ◆ **Current status**
The following is the current status and brief history of the Company's public involvement activities (Canfor 2000c: Tab "public involvement opportunities"):
 - Active FMAC meeting on a monthly basis;



- Annual AOP/5 year GDP open houses in Grande Prairie as well as Valleyview;
 - Townhall meetings for the DFMP in November 1998 in Valleyview, Crooked Creek and Grande Prairie. Minutes of those meetings are on file;
 - Two written submissions since November 1999. Response letters are on file and tracked in the Incident Tracking System;
 - *Trapper Notification Program* has been operational for 2 years; and
 - The Stakeholder Database is currently operational.
- ◆ **Forecasting assumptions and analytical methods**
Not applicable.
 - ◆ **Forest management activities**
Not applicable.
 - ◆ **Implementation schedule**
Canfor will continue with the FMAC, AOP/5 year GDP open houses and *Trapper Notification Program*. Field tours are offered to the FMAC annually. The stakeholder database is periodically updated.
 - ◆ **Monitoring procedure**
The public involvement opportunities in which Canfor participates will be reported in the *Annual Performance Monitoring Report*.
 - ◆ **Linkages between strategic and operational plans**
The *Public Involvement Program* has a direct link to the DFMP; therefore, the operational plans must consider the applicable public input that is received.



(6f) Critical Element

Collective understanding of forest ecosystems, values, and management is increased and used in the decision-making process

(6f) 1. Value

Knowledge of forest ecosystems and processes

(6f) 1.1 Goal

To use adaptive management to improve the knowledge regarding ecological processes and the natural historic and current disturbance patterns for each ecosystem and to apply this knowledge to management of the resources within the FMA area

(6f) 1.1a. Indicator

The degree to which the actual field performance aligns with the DFMP

Field performance includes results of actual practices, as well as the results of on-going research.

(6f) 1.1a.1 Objective

To produce a Forest Stewardship Report, every 5 years, as a measure of accountability to the public of management effectiveness

The Forest Stewardship Report, required by the Alberta Sustainable Resource Development, will identify monitoring programs and research needed to correct performance problems and to enhance success. The report will also include an evaluation of Sustainable Forest Management Plan (SFMP) goals and objectives (actual vs. planned). The submission schedule will be detailed in the DFMP.

◆ **Acceptable variance**

The Forest Stewardship Report shall be submitted within one month of the submission schedule, as stated in this DFMP.

◆ **Current status**

The first submission is required 5 years after the approval of the DFMP as stated in the *Interim Forest Management Planning Manual* (Alberta Environmental Protection 1998a).



- ◆ **Forecasting assumptions and analytical methods**
Not applicable.
- ◆ **Forest management activities**
A Forest Stewardship Report will be prepared to report on the effectiveness of forest management activities in meeting the DFMP objectives.
- ◆ **Implementation schedule**
The first submission will be 5 years after the DFMP approval.
- ◆ **Monitoring procedure**
The monitoring activities and results will be contained within the Forest Stewardship Report.
- ◆ **Linkages between strategic and operational plans**
Verification of strategic and operational compliance with respect to the Sustainable Forest Management Plan (SFMP) and DFMP.

(6f) 1.1a.2 Objective

To validate Canfor's assumptions and test new theories to improve our knowledge of forest ecosystems by conducting on-going research

- ◆ **Acceptable variance**
The acceptable variance is zero.
- ◆ **Current status**
There are various programs and initiatives being conducted to increase knowledge about the forest, such as:

Pre-harvest Silviculture Prescriptions (PHSP)

Silviculture prescriptions (treatments) are based upon ecological site classification surveys conducted annually on proposed harvest areas.

Refined Northern and West-Central Alberta Field Guides

Data from a total of 1,395 local plots in the FMA area were used to refine the field guides (Canfor 1999i) and prepare a pocket-sized field guide (Canfor 2000k). The refined field guides provide a more locally explicit description of the ecosites, ecosite phases and plant community types in the FMA area. The ecological inventory information will provide input to the modelling forecasting tools thereby increasing Canfor's understanding about the spatial and temporal dynamics of ecosystems at the landscape and site level and aid in decision making with regards to silvicultural intensity and treatment regimes. The refined field guides (Futoransky et al 2000a and Futoransky et al 2000b) were used for the first time on an operational level in 2000. Refer to Section D 3.1 for additional information regarding ecological classification.

Ecosite and Ecosystem Mapping

In this project, various sources of data (AVI, ecological plot data, digital elevation models (DEM) and DEM derived data (e.g. slope and aspect) are used in combination with statistical techniques and expert knowledge to identify and map ecosites and ecosite phases (Canfor 2001a). Ecosites provide an ecological foundation for site assessment, silviculture



prescriptions, defining summer ground, development of yield curves and productivity assessment. The resulting maps define the forest at various spatial scales of management and operational importance.

Succession Analysis and Modelling

This program focuses on evaluation, analysis and modelling of chronosequences (changes over time) for each ecosite in the FMA area (Canfor 1998b). Relationships between stand age, stand structure and biodiversity will be identified. This knowledge of successional patterns will assist us to understand temporal changes in forest condition at both the stand and landscape levels.

Forest Productivity Assessment, Analysis and Modelling

The scope of this project is to assess forest productivity in the FMA area. The relationship between forest productivity and numerous ecological variables will be evaluated and predictive models developed (Canfor 2001). The results from this research will increase Canfor's understanding about the relationship between forest productivity and the chemical, physical and biological properties of soil.

Plant Biodiversity Analysis and Mapping

Plant species will be evaluated in terms of the environmental and the soil and site variables that influence their distribution, abundance and growth. A predictive model will be developed (Canfor 2001f) that evaluates the likelihood of ecosites having rare plant species and high plant biodiversity values. Thus, knowledge of plant biodiversity will allow flexibility in ecologically based, long-term forest management planning.

Wildlife Habitat Evaluation

Wildlife species guilds (Canfor 1998b) will be developed through an analysis of habitat suitability for various wildlife species at the ecosection level. Each ecological unit will be evaluated to determine the degree to which it can support the life stages of guild representatives. Thus, knowledge of habitat suitability for several guilds that represent a wide range in habitat conditions will allow flexibility in ecologically based, long-term forest management planning.

EMEND (Ecosystem Management by Emulating Natural Disturbance)

The EMEND project will study how harvest and regeneration of upland, mixedwood forest can best approximate natural disturbance regimes (Canfor 1998d). Predictive models will project the ecological effects of alternative harvesting decisions (various amounts of residual structure left after harvest) on boreal landscapes. A number of disciplines will be conducting research under the EMEND umbrella (Canadian Forestry Service 2000). Such integration focuses all efforts toward providing increased understanding of natural, disturbance-based forest management. Refer to Section F 16.1.4 regarding additional information regarding EMEND.

Growth and Yield (several programs)

The growth and yield data (Canfor 1999b and Canfor 1998a) will be tied to the relevant ecosite characteristics, allowing the development of ecological based yield curves for resource and timber supply analysis and evaluation.



By using an ecological foundation for the development of yield curves, productivity and fiber flow will be tied to the ecological processes acting at the site or stand level. This will facilitate the integration of resource and timber supply analysis with site level operations and silviculture.

Collection of Data on Coarse Woody Debris and Snags (Pre-Harvest)

Coarse woody debris and snag information was collected on 1,395 plots and used to assist in developing targets for the resource and timber supply analysis for the DFMP. Canfor is also collecting the same information in the annual operational cruise program to determine the existing amount of coarse woody debris and snags (Canfor 2000f). This information will assist in the development of harvesting and silviculture strategies that emulate the natural range of variability of coarse woody debris and snags. Refer to Section F 9.1.1 for additional information regarding coarse woody debris.

- ◆ **Forecasting assumptions and analytical methods**
Forecasting and analytical methods are different for each of the various programs listed. See above.
- ◆ **Forest management activities**
The management activities for each of the programs are separately identified. See above.
- ◆ **Implementation schedule**
To carry out and analyze the various different research and monitoring programs as generalized above.
- ◆ **Monitoring procedure**
The monitoring program is stated in this DFMP.
- ◆ **Linkages between strategic and operational plans**
These links are described in this DFMP. Each program is independent of the other.

Additional Goals, Objectives and Indicators

Canfor has developed other goals, objectives and indicators in addition to those presented in the preceding section. A discussion of each objective follows.

(7) Objective

To produce fully integrated operational plans - Annual Operating Plan (AOP) and 5 Year General Development Plan (GDP) for the 2003 Submission.

To accomplish this objective, Canfor must involve all forestry operations in the FMA area and work co-operatively with active deciduous companies (refer to Section E 5.2).

- ◆ **Acceptable variance**
The acceptable variance is zero with regard to producing fully integrated operational plans (AOP and GDP) for the 2003 submission.



◆ **Current status**

Tolko and Canfor collaborate during the production of operational plans so each company is aware of the plans of the other. Efforts are made to ensure that operations are conducted in conjunction with one another.

Canfor has entered into an agreement with Ainsworth to negotiate a management agreement whereby Canfor will supply deciduous timber to Ainsworth's Grande Prairie mill. Pending a successful resolution of this negotiation, operational plans to include Ainsworth's deciduous requirements will be fully integrated.

◆ **Forecasting assumptions and analytical methods**

Not applicable

◆ **Forest management activities**

The forest management activities will include operational planning with links to all other activities.

◆ **Implementation schedule**

A process will be developed with active deciduous companies, outlining the steps required to meet the objective, by December 15, 2001.

◆ **Monitoring procedure**

Progress towards development of the steps required to meet the objective will be monitored.

◆ **Linkages between strategic and operational plans**

All new harvesting plans will follow the strategic direction as outlined in this DFMP.

(8) Objective

To evaluate the range of variable retention configurations and develop a strategy by September 1, 2004.

An effective management strategy will make provisions for the use of a variety of tree retention configurations that allow managers flexibility to achieve a range of management objectives.

◆ **Acceptable variance**

The acceptable variance is zero with regard to development of a variable retention strategy by September 1, 2004.

◆ **Current status**

Current management practices leave a variety of tree configurations within cutblocks:

- Snags and wildlife trees;
- Unmerchantable patches;
- Protected understorey; and
- Buffers for watercourses, wildlife zones and inoperable areas within cutblocks.



Variable retention was not used as a constraint in the Detailed Forest Management Plan; however to make allowances for variable retention, where any merchantable volume remains on cut units it will be measured and the corresponding volume will become a component of the timber drain (i.e. AAC chargeable). Canfor is committed to submitting information regarding this procedure to ASRD and will work co-operatively to review information, identify issues and determine the appropriate courses of action.

- ◆ **Forecasting assumptions and analytical methods**
Not applicable until the range of variable retention configurations is evaluated.
- ◆ **Forest management activities**
Not applicable until the range of variable retention configurations is evaluated.
- ◆ **Implementation schedule**
The current practice will be continued until the steps required to meet the objective are defined. The date for completion is December 15, 2005.
- ◆ **Monitoring procedure**
Progress towards achievement of the objective will be monitored.
- ◆ **Linkages between strategic and operational plans**
Once developed, the variable retention strategy will be implemented operationally.

(9) Objective

To identify ranges and type of stands that are being utilized by woodland caribou to assist in development of a strategy compatible with West Central Alberta Caribou Standing Committee objectives.

The data collected under the Caribou Research Project, currently being conducted by West Central Alberta Caribou Standing Committee (WSACSC) will provide assistance to Canfor in the continuing development of a caribou management strategy. Refer to Section F 5.3.3.1 for additional information regarding woodland caribou.

Canfor will be applying the current habitat cover constraints as indicated in Section F 5.3.3.1.4 until the development of "new" caribou habitat constraints are developed under this objective.

- ◆ **Acceptable variance**
The acceptable variance is not applicable at this time as caribou research is on going.
- ◆ **Current status**
The Company provides support for the research being conducted by the West Central Alberta Caribou Standing Committee.

Canfor is currently conducting a winter Track Monitoring Program to determine the areas being used by caribou and other species (i.e. deer,



moose, elk, wolf, otter, etc). A visual sighting program for caribou and other species is also conducted. These sightings are incorporated into the Track Monitoring Program database.

Locked gates restrict access on Canfor's roads into the Caribou Area. Lower class roads and existing linear disturbances are used whenever possible within the area.

During layout and pre-harvest assessments, lichens used by caribou as a food source are identified to determine if an area has potential for caribou habitat.

As a member of the Little Smoky Local Planning Team, Canfor provides in-kind support and operational expertise in the *Speeding Recovery of Existing Linear Corridors Pilot* (WCACSC 2001). The goal is to re-vegetate corridors or parts of linear disturbances to a treed successional path at a pace greater than natural succession.

◆ **Forecasting assumptions and analytical methods**

Not applicable until research studies are complete.

◆ **Forest management activities**

As a member of the West Central Alberta Caribou Standing Committee, the Company provides support for the research being conducted and will use the resultant data in the development of a caribou management strategy.

Canfor will continue the tracking and visual sighting programs.

◆ **Implementation schedule**

As data becomes available from research projects, it will be evaluated and its role in development of a caribou strategy will be determined.

◆ **Monitoring procedure**

Progress will be monitored and reported in the *Annual Performance Monitoring Report*.

◆ **Linkages between strategic and operational plans**

The 2001 A.O.P. harvesting plans for the Caribou Area follow the strategic direction outlined in this DFMP.



5. Issues and Opportunities

The Task Force that developed *Canfor's Forestry Principles* identified many challenges and opportunities including:

5.1 Ecological

Challenges

- B.C. and Alberta have a wide range of forest ecosystems from coastal temperate rainforest through sub-boreal to true boreal. Canfor operates in many of these ecosystems and will need specific solutions to implement its vision; and
- Identifying and maintaining “ecological integrity” across Canfor’s diverse landscapes will require that the Company understands the ecological processes and manages for them. Specific research and monitoring is needed to achieve this.

Opportunities

- Canfor has the opportunity to increase its knowledge of the ecosystems in which it operates and to move from administrative forestry to ecologically-based forestry; and
- An ecological approach will enable Canfor to address a greater range of values.

5.2 Technological

Challenges

Canfor’s forest management strategies have always tried to respect the different ecosystem conditions, but it has often been constrained by factors of technology and knowledge such as:

- The lack of inventory information about timber and other forest values; and
- The inadequacy of modelling and forecasting tools to predict future forest conditions.

Opportunities

- Canfor has the opportunity to work with research and academic institutions and to participate in research and development projects to improve existing modelling tools, to adapt them to fit the Company’s local conditions and to help develop new tools. Funding sources are available to enhance Canfor’s own financial resources.

5.3 Administrative/Regulatory

Challenges

- The public process of land use planning and landscape unit planning is inadequate and incomplete;
- The tenure system (particularly volume-based) has limited Canfor’s ability to plan and manage for the long-term and at the broader landscape level; and
- A number of current regulations limit innovative approaches to forest management because of governments’ focus on management processes rather than on short and long-term results.



Opportunities

- Conditions within industry and government are at a point where major changes to the regulatory environment are necessary and desirable, i.e. tenure reform and the move toward results-based regulations; and
- Canfor has the opportunity to reduce the bureaucratic workload for both the Company and the Government by taking on more of the workload and applying efficiencies.

5.4 Timber Supply

Challenges

- Implementation of forest ecosystem management may result in reduced timber harvest levels in some areas.

Opportunities

- The desired tenure changes could provide a more secure and longer-term timber supply for the Company;
- Some form of zoning will allow Canfor to enhance its timber growing capability on some lands while accommodating non-timber resources on other land; and
- Improving public trust through the Company's actions will enhance its access to present and future timber supply.

5.5 Costs

Challenges

- The majority of Canfor's tenured timber volume is in British Columbia, the province with some of the highest fiber costs in North America. The overall cost of managing and harvesting the forest resource must decline if Canfor is to be profitable and successful in achieving its goals.

Opportunities

- The required reductions in bureaucratic processes will save time, money and personnel resources, e.g. administration of the Forest Practices Code in B.C.

5.6 Markets

Challenges

- The current strategy and focus of some environmental organizations is to target forest products customers in high-profile international markets to influence forest policy.

Opportunities

- Canfor has the opportunity to implement certification initiatives that will maintain its access to markets; and
- Canfor will be better able to respond to public concerns and questions with enhanced information on ecological processes.



5.7 People/Communities

Challenges

- Canfor's key stakeholders have different expectations and needs from the forest. For example, it will be difficult to meet the needs of Canfor's customers who want increased product volume while meeting the public's demand for more non-timber resources from the forest, such as wildlife and old growth.

Opportunities

- Foresters and others will have an opportunity to use their expertise in innovative ways, which will improve professional satisfaction, professional credibility and professional development. The Company will get its foresters back on the ground developing management solutions;
- Canfor has the opportunity for improved relations with Aboriginal people; and
- Canfor will build stronger relationships with communities and environmental organizations.





H. RESOURCE AND TIMBER SUPPLY ANALYSIS

1. Introduction

Canfor has adopted an ecological approach for developing the *Detailed Forest Management Plan* (DFMP) in order to address the innumerable challenges that arise in the successful management of forest ecosystems. The Plan is based on *Canfor's Forestry Principles* (Canfor 1999a) which will provide the foundation for forest management strategies, policies and operating procedures for its operations into the next century.

Public participation is considered to be significant to the development of a successful ecologically-based DFMP. Canfor initiated a process of public participation in August 1995 through the formation of the Forest Management Advisory Committee (FMAC) and the Forest Ecosystem Management Task Force (FEMTF). The guidance and input from these organizations have been integral to the development of the DFMP.

Tolko Industries Ltd., Ainsworth Lumber Company Ltd. and Grande Alberta Paper Ltd. played an integral role in development of the DFMP by providing editorial and technical input regarding strategic and operational plans, *Resource and Timber Supply Analysis*, growth and yield projections, and harvest sequencing.

The ecosystem-based approach to forest management has been developed in response to a need to find solutions in resource management that are ecologically and economically sound, as well as being socially acceptable. A *Resource and Timber Supply Analysis* is a process that explores the interactions between these varying demands and the effects that the different management strategies eventually have on the values concerned.

Under the direction of Dwight Weeks (Forest Planner), Olympic Resource Management (ORM) has provided analytical and inventory services for the *Resource and Timber Supply Analysis*. ORM used the simulation model COMPLAN and the optimization model, WOODSTOCK, as tools for the analysis. The scenarios were run using both optimization and simulation models to gain further insight into the results of the forest planning decisions. The optimization results were used as a point of reference with which to compare the simulation results.

In 2000, a benchmark scenario conducted by ORM demonstrated that new inventory data and yield tables would have little effect on the Annual Allowable Cut (AAC) determined for the 1991 DFMP. This study concluded that changes in harvest levels would be the result of new management objectives and practices applied in subsequent analyses.

Canfor's Grande Prairie *Sustainable Forest Management Plan* achieved certification of its forestry operations to the Canadian Standards Association (CSA) Z809-96 standard in June 2000. The purpose of the CSA standard is to describe the components and performance objectives of a sustainable forest management system. Through a process of public participation, the CSA performance framework attains a local relevance in the form of locally determined values, goals, indicators and objectives. Such participation by the FMAC resulted in the development of the *Sustainable Forest Management Plan for Canfor's Alberta Region, Grande Prairie Operations* (June 2000).



The primary components of the *Sustainable Forest Management Plan* (SFMP), including values, goals, indicators and objectives, are contained in the DFMP.

Management alternatives that address the objectives were evaluated based on a series of COMPLAN and WOODSTOCK runs that use preliminary goals and constraints as established by the FMAC and FEMTF, existing and newly compiled information. A final run was conducted so that the final management alternatives could be selected. Alberta Sustainable Resource Development, Land and Forest Division (LFD) was presented with the results at critical stages and has been kept informed as the analysis proceeded.

The resource management strategies examined were tested against the related objectives and compared to each other. The process involved extensive consultation with the public, other timber resource users, other stakeholders, and the government. Balancing the competing objectives of these groups is a very complex process. On the basis of this evaluation and consultation, the scenario that best met non-timber and timber objectives was selected as the preferred strategy (Scenario 4C described below). This strategy is “preferred” because it is the one that best meets all of the objectives (environmental, social and economic).

The management objectives of the *Resource and Timber Supply Analysis* are:

- Wood flow including both coniferous and deciduous volumes, maintenance of current deciduous allocations and other allocations of deciduous volume;
- Watershed protection achieved by limiting the amount of vegetation cover removed within defined watershed;
- Maintenance of habitat conditions required for the selected indicator species; moose, American marten, pileated woodpecker, barred owl, bull trout, woodland caribou and trumpeter swan; and
- Maintenance of seral stages within a natural disturbance regime at present and at key points in time.

A series of seven scenarios were run using COMPLAN:

1. Scenario 1C is a benchmark run completed to determine the effect of new inventory data and yield tables on the AAC as compared to the previous timber supply analysis carried out in the 1991 DFMP. The results illustrate that little change can be expected in the harvest levels due to the new inputs. This indicates that any changes in harvest levels in subsequent analyses will be due to changes in management practices, assumptions or objectives and not due to changes in inventory data or yield table information. The report, *Supplementary Timber Supply Analysis: Benchmark Run Results and Amended Timber Supply Analysis Information Package* details the results of this run;
2. Scenario 2C is an unconstrained aspatial run that is intended to provide the maximum sustainable coniferous timber harvest achievable in the absence of constraints;
3. Scenario 3C is a full spatial run with sub-compartment aggregation that is intended to determine the coniferous and deciduous harvest levels when green-up and caribou habitat requirements are implemented;
4. Scenario 4C is a full spatial run intended to include all the parameters from Scenario 3, but to modify them as necessary to meet acceptable levels of seral stage and patch size distribution in all landscape management units;



5. Scenario 5C is based on Scenario 4 and investigates the effect of a less aggressive regeneration strategy on the coniferous and deciduous levels;
6. Scenario 6C is a full spatial run that examines the risk associated with the regeneration strategy proposed ;and
7. Scenario 7C is a full spatial run intended to examine the effects of pursuing a strategy of reducing the level of risk present in the landscape due to fire.

The model inputs include information such as forest inventory that helps to describe the current forest status, growth and yield information for yield table assignment and management/operational information.

The preferred management strategy results in sustainable coniferous and deciduous wood flows. These harvest levels are achieved while assuring that non-timber resources are also maintained on a sustainable basis. These resources include natural biodiversity, wildlife habitat for numerous key species and water quality that is controlled on a watershed basis.

The results from the timber supply analysis show that a coniferous harvest (annual allowable cut) of 670,000 m³/year is achievable in the long term. This level of coniferous harvest will support a deciduous annual allowable cut of 453,000 m³/year. However, the model runs also indicate that a lower level of coniferous harvest is initially necessary; until 2018, only 640,000 m³/year can be harvested, if 670,000 m³/year is to be sustained for the long term.

The risk associated with the assumed volume gains from the regeneration strategy appears to be minimal based on the results of Scenario 5C and 6C. A coniferous non-declining even-flow harvest of 550,000 m³/year was determined when all the benefits from enhanced silviculture were eliminated. Maintaining the coniferous and deciduous harvest at 640,000 m³/year and 453,000 m³/year respectively for the first 20 years did not result in a reduction of the long-term sustainable harvest level identified in Scenario 5C.

The *Resources and Timber Supply Analysis* is provided in its entirety in Appendix 3.





I. IMPLEMENTATION

1. Future Forest State

An important component of forest ecosystem management is the need to forecast or predict future forest conditions. In this Plan, forecasts have been made for 200 years. By integrating the current understanding of ecosystems and natural disturbance patterns with human uses and values, an array of future forest conditions can be modeled and projected. The outcomes can be tested against an ecological baseline of what could occur naturally to ensure that the Company's influence on the ecosystem, through its management practices, falls within the range of natural variability. This must be an ongoing process that will continually input new data and will adapt or adjust to changes in the ecosystem and to changing human values and uses. If successful, the result will be a future forest condition that will best meet the needs and wants of interested or involved communities while maintaining ecosystem structure, flows and benefits.

The pathway to forecasting future forest conditions includes:

- An understanding of the ecological processes and the natural historic and current disturbance patterns for each ecosystem;
- The establishment of an ecological baseline and a range of natural variation that could occur without human intervention;
- Recognition and incorporation of human values and uses;
- Identification of communities of interest and providing these communities with information and an opportunity for involvement;
- Projection of possible outcomes or future forest conditions within the range of natural variability;
- Ongoing measurement and monitoring of key environmental, social and economic indicators;
- Ongoing research to validate assumptions and to test new theories; and
- Ongoing checks to ensure the process is still on course and if not, making changes to management strategies or practices as required (*Canfor's Forestry Principles*).

The future forest will change. These changes will occur both naturally and through human intervention. It is expected to be different spatially, but approximate present day characteristic both structurally and proportionately. One could expect that some proportions, values and productivity will be enhanced over time by virtue of strategies of intervention and management.

Environmental, social and economic strategies, goals and objectives have been presented throughout the DFMP to assist in forecasting the future forest condition. Target(s) and acceptable variance(s) for measuring performance in achieving those strategies, goals and objectives have been established. Our performance in achieving the target(s) / acceptable variance(s) will be monitored and the results reported to the public and regulatory agencies through a *Five Year Stewardship Report* and *Annual Performance Monitoring Report*. If measurable targets begin to diverge from predicted outcomes, we will use adaptive management to adjust our management practices. All of the relevant targets that forecast a future forest state will be considered collectively when evaluating Canfor's performance in achieving the desired future forest.



The following is a summary of the main elements of the future forest:

- The future forest will maintain the capacity of the forested landbase to support a sustainable flow of timber and non-timber values for future generations.
- Seral stage distribution “is important for the conservation of biodiversity because it enables timber harvests to be planned so as to maintain a full range of successional habitats for wildlife and ecosystem types over the long-term” (CCFM 1997: p.2). The intent of the planning strategy contained within the DFMP is for the future forest to contain seral stages in proportions similar to those obtained by theoretical fire-return intervals for the Boreal Forest and Foothills Natural regions within the FMA area. Refer to Section G “Critical Element 1a, Objective 1.2a.1”.
- It is projected that the future forest will maintain its productivity in relation to a host of values. This maintenance of values will fluctuate within the defined parameters of the natural range of variability. It is Canfor’s intent to maintain the proportions of landscape structure and those values identified above now and in the near future by implementation of this Plan. Landscape structure (refer to Section G “Critical Element 1c, Objective 1.2a.1”) and spatial configuration distributions are provided for:
 - Landscape composition:
 - ❖ Seral stage distribution (habitat type);and
 - ❖ Patch size distribution (habitat size).
 - Landscape configuration:
 - ❖ Fragmentation (mean patch size);
 - ❖ Connectivity (mean nearest neighbour distance); and
 - ❖ Patch shape (area-weighted mean shape index).

Habitat suitability indices and carrying capacities have been developed for 4 selected indicator species including moose, American marten, pileated woodpecker and barred owl (refer to Section G “Critical Element 1b, Objective 1.1b.1”). It is intended that the future forest will adequately maintain and support these 4 species. Canfor is committed to participating jointly with ASRD regarding HSI models, inputs and carrying capacity to assist in identification of management issues and determination of management strategies.

- Woodland caribou and trumpeter swan habitat constraints have been included in the *Resource and Timber Supply Analysis* (Appendix 3) (also refer to Section G “Critical Element 1b, Objective 1.1b.2”). It is the intent of this Plan that woodland caribou and trumpeter swan habitat will be maintained throughout the 200-year planning horizon and that similar proportions of this type of habitat will be found in the future forest, although locations of caribou habitat compared to the present day forest are expected to change.
- Bull trout habitat is, in part, dependent on the amount of vegetated cover within a watershed. Vegetated cover removal must therefore be managed to maintain adequate habitat. If too much is removed at one time, the resultant water yield increases (quantity and timing of run-off) may affect bull trout habitat. The impact on Bull trout will be minimized if no more than 20-40% of the forest cover is removed in



the area above the H60 within a defined watershed²⁷ (refer to “Critical Element 3c, Objective 2.1a.1”). It is the intent of this Plan to maintain ECA of 35% in defined watersheds within the Bull trout area throughout the 200-year planning horizon.

- Seventeen yield groups identified for this Plan will be maintained (refer to Section C 2.4 and Appendix 3). Canfor is committed to submitting seral stages linked to yield groups to assist the Company and ASRD to evaluate the ecological implications of the DFMP. Canfor will provide rationale on how age categories were selected for each yield group seral stage. The Company and ASRD will work cooperatively to review information, identify issues and determine the appropriate courses of action.
- Rare physical environments, including Alberta Special Places designations and the Parabolic Sand Dunes, will be protected from harvest. A combination of rare physical environments and managed forests will be maintained (refer to Section F 8.1). Canfor’s activities within the FMA area will not jeopardize the proportions and spatial locations of these features within the future forest, however the activities of others may change the relative proportions of specific rare physical environments over time.
- Grasslands greater than 4 ha will not be reforested (Section F 8.2.3) Canfor’s activities within the FMA area will not jeopardize the proportions and spatial locations of these features within the future forest, however the natural processes and the activities of others may change the relative proportions of grasslands environments over time; and
- Enhanced information regarding the distribution of rare plants will be available as Canfor personnel find and report on any rare plants found within the FMA area (Section F 6). It is the intent of this Plan to manage rare plants found by the Company within operational areas by deferring harvest until an expert can be retained to provide management recommendations. The recommendations will be evaluated and implemented based on the specifics of the case. The activities of others may change the relative proportions of rare plants over time.

2. Implementation of Detailed Forest Management Plan

For information regarding the relationships between the various plans and the operational implementation of the Detailed Forest Management Plan (DFMP) refer to Section F as follows:

- F 2.0 Relationship of Detailed Forest Management Plan, Annual Operating Plan and 5 Year General Development Plan;
- F 2.1 Annual Operating Plan and 5 Year General Development Plan;
- F 2.2 Operational Implementation of the Detailed Forest Management Plan;
- F 2.3 Implementation of the Detailed Forest Management Plan Harvest Sequence;
- F 2.4 Harvesting the Profile Established by the Detailed Forest Management Plan,
 - F 2.4.1 DFMP / AOP Validation Process; and

²⁷ The watershed area above H60 is considered as the source area for the major snowmelt peak flows (B.C. Ministry of Forests 1999).



- F 2.5 Timber Harvest Planning and Operating Ground Rules.

3. Training

An important component of implementing any “new” plan is ensuring that all personnel involved in the management, supervision and implementation phases receive relevant training regarding the strategies, objectives, tactics, standards and initiatives. Training needs for the Detailed Forest Management Plan (DFMP) will be identified through Canfor’s Environmental Management System (EMS) and action plans developed to ensure the necessary training is received. Refer to Section E 4.2 for additional information regarding EMS.

4. Transition Period

Some of the initiatives described within this Plan have been incorporated into operational plans, including the established harvest rate. The transition from the 1991 DFMP (or “old” plan) to the 2001 DFMP (“new” plan) will not be immediate to enable approved Annual Operating Plans to be implemented and completed. The approval of the new plan and development of the ‘new’ ground rules should shorten the transition period.



J. PERFORMANCE MONITORING AND REPORTING

1. Monitoring

In 1994, the International Union of Forestry Research Organizations (IUFRO) released international guidelines for forest monitoring and set forth the following definition:

“The periodic measurement or observation of selected physical, chemical and biological parameters for establishing baselines and for detecting and quantifying changes over time” (IUFRO 1994).

Within the general context of forest management, there are 2 types of monitoring:

1. Forest resource monitoring – This refers to the physical and biological characteristics of various forest resources and their attributes. It includes ecological and habitat values, plus spatial distribution of timber types and growth and yield. Objectives focus primarily on monitoring predictions of future forest conditions found in plans (e.g. Detailed Forest Management Plan yield tables, Sustainable Forest Management Plan, enhanced forest management, etc.) and performance against these plans and regulatory standards (reforestation standards, etc.); and
2. Forest activity monitoring – This entails tracking forest management activities to ensure they take place as planned. In addition to resource intervention activities (e.g. harvesting, planting, etc.), this includes all the planned data collection and data management activities, which support decision making, including monitoring.

This section provides information on the various monitoring activities that will be conducted under this Plan:

- Growth and yield monitoring; and
- Other monitoring conducted in relation to Canfor’s Sustainable Forest Management Plan (SFMP).

1.1 Growth and Yield Monitoring

Canadian Forest Products Ltd., Ainsworth Lumber Company Ltd., Tolko Industries Ltd. and Grande Alberta Paper Ltd. are developing objective-driven performance standards for future regenerated stands. These unique standards will:

- Provide the means for monitoring the results of EFM;
- Enable innovative solutions to forest management problems; and
- Better reflect the objectives of the newly developed Detailed Forest Management Plan (DFMP).

Olympic Resource Management (ORM) was retained to prepare a document to outline the various components required in a growth and yield monitoring program, including a discussion of the permanent sample plot program. The resultant framework for monitoring growth and yield within this DFMP is described in the report *Growth and Yield Monitoring Program* (ORM 2001a). The report (Appendix 13) describes how the program can address the various initiatives, plans and regulations that affect the FMA area. Short-term needs, such as the methodology for monitoring yield forecasts, are discussed. Further, ongoing long-term requirements for improving and monitoring yields



along with an analysis of the general data requirements for both short-term and long-term needs are also addressed. All companies have provided input and are in agreement with the final version.

The strategy for developing the specifics of the *Growth and Yield Monitoring Program* was presented to Alberta Sustainable Resource Development in the document, *Model II – Objective-Driven Performance Standards Phase 1 – Strategy Development (ORM 2001b)* (Appendix 14).

The document outlines the principles that guide the development of the standards as follows:

- The standards shall ensure the long-term maintenance of both coniferous and deciduous profiles in the mixedwood landbase;
- The standards shall be based on ecosystem management principles;
- The standards shall be linked to current practices and DFMP objectives;
- The standards shall be an integral part of Canfor's *Growth and Yield Monitoring Program*;
- The standards shall be compatible with Alberta's basic regeneration standards;
- The standards shall provide for statistically defensible data analysis;
- The standards shall provide for operationally feasible and cost-effective field data collection; and
- The standards shall be subject to on-going review and validation.

1.2 Permanent Sample Plots (PSP)

Canfor maintains a variety of permanent sample plots within the FMA area including timber inventory, Northern Interior Vegetation Management Association (NIVMA) (refer to Section F 15.1.8, Foothills Growth and Yield Association and Western Boreal Growth and Yield Association (WESBOGY) (Figure 143). The plots are, or will be, used for a variety of reasons:

- Forest management plans (resource and timber supply analysis);
- Stand tending control plots;
- Growth and yield modelling;
- Development of variable regeneration standards;
- Silvicultural prescriptions;
- Managed stand yield tables; and
- Enhanced management of white spruce and aspen.

Refer to Table 65 and Appendix 13 for additional information regarding PSP.



Table 65. Permanent Sample Plots Within the FMA Area

DFMP_Tables.xls
Table 73

Type of Permanent Sample Plot	Number Established Y-T-D
Timber Inventory	839
Foothills Growth and Yield Association	6
NIVMA ¹	20
WESBOGY ²	2
Total	867
1. Northern Interior Vegetation Management Association	
2. Western Boreal Growth and Yield Cooperative	

Source: Canfor compiled data

1.2.1 Timber Inventory Plots

Permanent Sample Plot (PSP) and Temporary Sample Plot (TSP) data were both used in compilation of inventory databases used in development and validation of Canfor's Multiple Utilization Yield Table System (MUYTS) (Canfor 1999f). The system was used within the resource and timber supply analysis for calculation of the annual allowable cut (AAC). Refer to Appendix 3 for additional information regarding yield tables.

1.2.2 Western Boreal Growth and Yield Association (WESBOGY) Plots

The Western Boreal Growth and Yield Association (WESBOGY) has 14 agencies and companies as members (Table 66). Canfor has been an active member of the Association since 1985. The main focus of WESBOGY is the mixedwood growth and yield of boreal spruce and aspen. Their primary study is designed to advance the understanding of the dynamics of these mixedwood stands under intensive management from establishment to final harvest. Data for early stand growth, mortality and crown dynamics will be used to develop an individual tree growth model. The data will also be used in the development of a model of crown plasticity of hardwood and softwood trees in mixed stands.

Data obtained from the WESBOGY studies will enhance the management of forest resources by providing a continually improving, scientific, quantitative and credible basis for:

- Evaluating and selecting silvicultural regimes and crop plans for the enhanced management of white spruce and aspen;
- Forecasting the sustainable supply of timber from forest tenures containing white spruce and aspen and validating estimates of allowable cut; and
- Improving the sustained yield of these forests through enhanced forest management.

The results will apply directly to the forest tenures of the member companies of the Association. Information will be used to assess, develop and approve strategies for enhanced and sustainable forest management within these forest tenures. It will be incorporated into variable regeneration standards, silvicultural prescriptions, crop plans, managed stand yield tables and forest management plans.



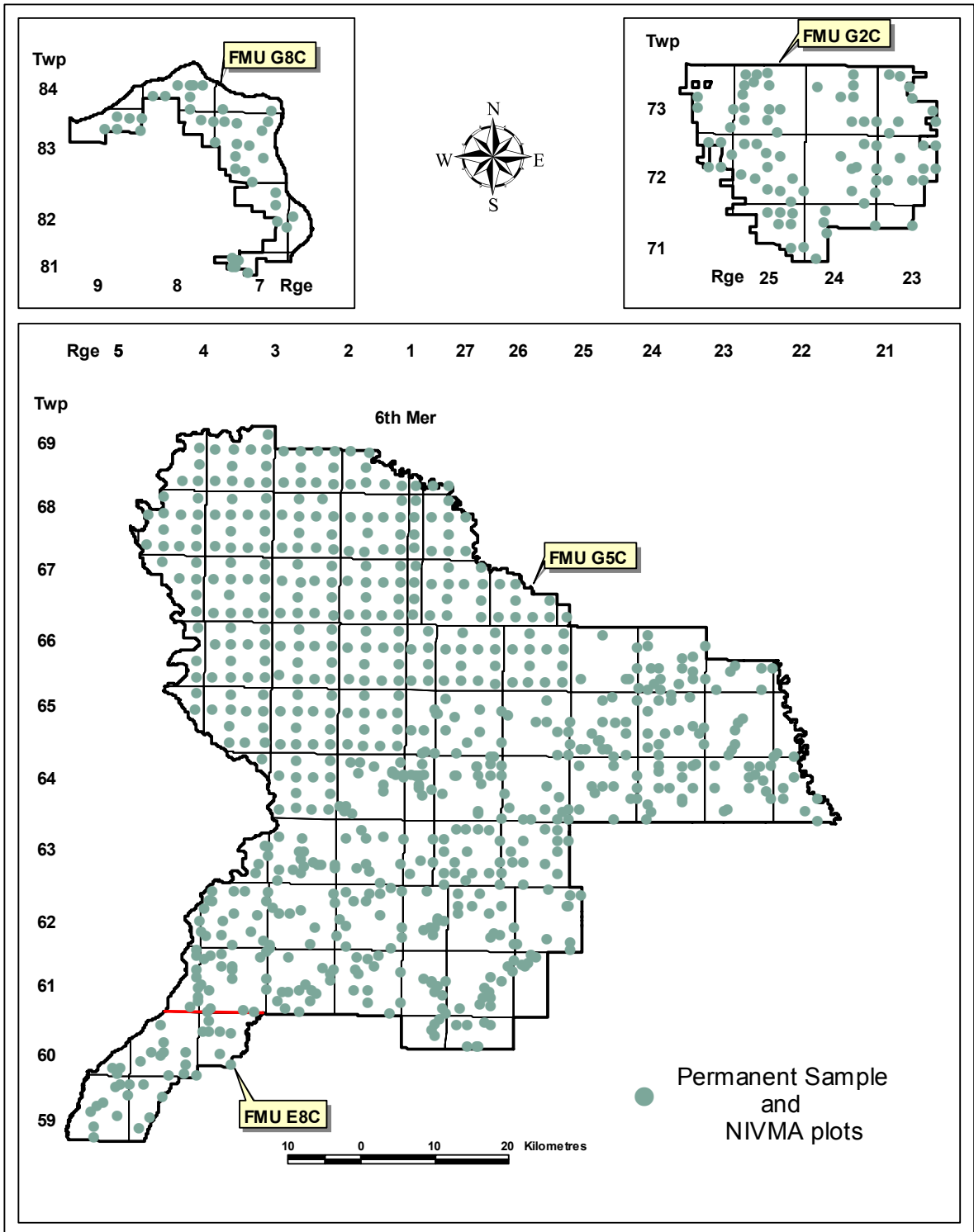


Figure 143. Canfor Maintains 841 Permanent Sample and NIVMA Plots Within the FMA Area

Table 66. WESBOGY Members (2000)

DFMP_Tables ver 1.xls
Table 54

WESBOGY Members (2000)
Alberta Sustainable Resource Development, Lands and Forest Service
Alberta Pacific Forest Industries Ltd.
British Columbia Ministry Of Forests, Victoria and Prince George, British Columbia
Canadian Forest Products Ltd., Grande Prairie, Alberta
Daishowa Marubeni International Ltd., Peace River, Alberta
Government of NWT, Forest Management Division, Hay River, NWT
Louisiana-Pacific Canada Ltd., Chetwynd Forest Resources Division, Dawson Creek, BC and Swan River, Manitoba
Manning Diversified Forest Products Ltd., Manning, Alberta
Mistik Management Ltd., Meadow Lake, Saskatchewan
Weldwood of Canada, Hinton, Alberta
Weyerhaeuser

Source: Canfor FRIP proposal

1.2.3 Foothills Growth and Yield Association

The potential value of a co-operative lodgepole pine growth and yield research program was recognized in 1997 by a number of companies holding Forest Management Agreements and Timber Quotas on the Eastern Slopes. In February 2001, 9 companies formed the Foothills Growth and Yield Association (Table 67). Alberta Sustainable Resource Development (ASRD) and the Foothills Model Forest are participating as non-voting members, with the Foothills Model Forest also acting as the coordinating agency.

Information and data collected by member companies will be used to assess, develop and approve strategies for enhanced and sustainable forest management within their forest tenures. It will be incorporated into variable regeneration standards, silvicultural prescriptions, crop plans, managed stand yield tables and forest management plans. Because trials are stratified on an ecosystematic basis rather than by tenure, the results will be generally applicable to much of the natural range of lodgepole pine in Alberta.

Table 67. Foothills Growth and Yield Association Members (2000)

DFMP_Tables ver 1.xls
Table 55

Member Companies (2000)
Alberta Newsprint Company Ltd.
Blue Ridge Lumber (1981) Ltd.
Canadian Forest Products Ltd.
Millar Western Forest Products Ltd.
Spray Lakes Sawmills Ltd.
Sundance Forest Industries Ltd.
Sunpine Forest Industries Ltd.
Weldwood of Canada Ltd.
Weyerhaeuser

Source: Canfor FRIP proposal (Canfor 2001o)



The goal of the Association is to forecast and monitor stand development and timber yields associated with enhanced forest management of lodgepole pine in the Lower and Upper Foothills and the Subalpine Natural subregions of Alberta. The goal will be achieved through a series of sub-projects developed cooperatively by members in consultation with government agencies and other experts in forest growth and yield. Sub-projects of the Association will be designed to deliver yield forecasts and establish validation programs for treatment regimes and site conditions of common interest to all members.

Two sub-projects are currently at various phases of planning and development:

1. *Forecasting and Monitoring of Growth and Yield in Regenerated Lodgepole Pine Stands* ("Regeneration Trial"). This sub-project is at an advanced stage of planning. Selection of experimental sites is currently underway and fieldwork is in progress. The establishment phase will be completed by March 31, 2002; and
2. *Determination of Potential for Increasing Yields of Semi-mature and Mature Lodgepole Pine* ("Late-stage Trial"). Implementation of this sub-project is scheduled for possible implementation commencing 2002.

1.3 Other Monitoring

Monitoring strategies and implementation timelines are an integral part of each objective identified in Section G. Refer to the components titled "*Implementation Schedule*" and "*Monitoring Procedure*" within each objective for the relevant information.

1.3.1 DFMP / AOP Validation

As Annual Operational Plans (AOP) are being developed, the DFMP strategies, directives and objectives are referenced in the operational plans. As operational plans are being implemented and laid out, then the objectives in the DFMP will be achieved. Since it is difficult to capture all of the nuances of the natural world, it is quite likely that there will be changes to operational plans. These changes will be reviewed in light of the DFMP objectives to ensure that Canfor is meeting its commitments. Objectives are checked for reasonableness through annual reviews. There is always the possibility that the objectives in the DFMP will have to be altered as a result of changing conditions. Using the principle of adaptive management, as new or changing information becomes available, the objectives in the DFMP will be reviewed and, where warranted, changed.

The AOP will be validated using a process as summarized below:

- DFMP resultant data is used as the initiation point;
- Static resultant is created;
- AOP to be validated is inputted;
- COMPLAN is run;
- Outputs are generated (reports that validate DFMP objectives).

1.4 Stewardship Reporting

Specific stewardship reporting strategies have been developed for all major components of the Detailed Forest Management Plan and are presented in this document.



The monitoring program will provide the information and data on which to measure performance in achieving the objectives defined in this Plan. After analysis and review, the results will be presented in various reports and submitted to relevant individuals, groups and organizations. Three primary reports will be developed:

1. *Five Year Stewardship Report*;
2. *Annual Performance Monitoring Report*; and
3. *Annual Public Report*.

The following section describes each report.

1.4.1 Five Year Forest Stewardship Report

As indicated in the *Interim Forest Management Planning Manual - Guidelines to Plan Development* (Alberta Environmental Protection 1998a), a performance monitoring and stewardship report should:

- Track actual activities in comparison to forecast activities;
- Track actual responses to management activities and compare to forecasted responses;
- Have the ability to detect and assess impacts arising from change;
- Trigger appropriate actions to correct or mitigate any negative impacts of the change; and
- Report on how the results of research projects, undertaken by Canfor, are being applied.

Within this Plan, the objective for the *Five Year Forest Stewardship Report* is to provide a measure of accountability to the public on management effectiveness (Section G "Critical Element 6f, Objective 1.1a.1"). To achieve that objective, a *Five Year Forest Stewardship Report* will be submitted within 5 years after the Detailed Forest Management Plan (DFMP) is approved. The report will provide information on the monitoring programs conducted as a result of this Plan. Performance concerns associated with this Plan will be provided. The report will also include an evaluation of the Sustainable Forest Management Plan (SFMP) goals and objectives (actual versus planned).

1.4.2 Annual Performance Monitoring Report

The *Annual Performance Monitoring Report* will provide the status of the forest management and operational activities conducted during the year. It will also provide a summary of the performance in meeting the objectives established in the DFMP.

The draft outline of the *Annual Performance Monitoring Report* will be prepared and submitted by September 30, 2001 and will include the *CSA Annual Progress Report* as a component.

1.4.3 Annual Public Report

The *Annual Public Report* will be comprised of relevant extracts from the *Annual Performance Monitoring Report*. It will function as an informational handout for distribution to the general public.



The *Annual Public Report* will be available for public review within 2 months after the submission of the *Annual Performance Monitoring Report*.

