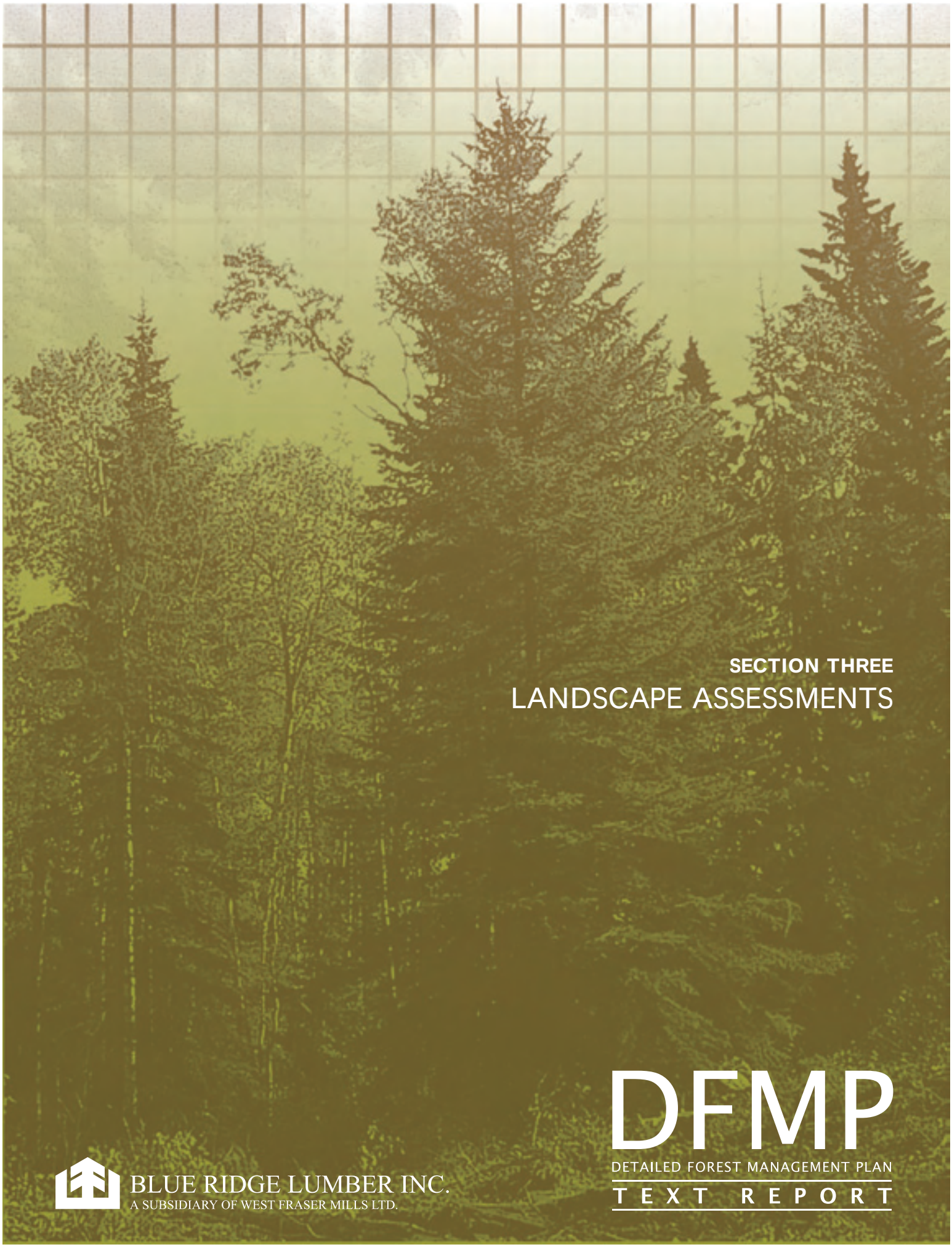

SECTION THREE

LANDSCAPE ASSESSMENTS

DFMP

DETAILED FOREST MANAGEMENT PLAN

TEXT REPORT

BLUE RIDGE LUMBER INC.

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3 Landscape Assessments

Blue Ridge Lumber completed several landscape assessment reports in order to get a better understanding of the economic, social and environmental values on the FMA area.

These assessments are intended to be used to improve sustainable forest management strategies and tactics, and to assist in the development of this DFMP plan as well as future plans.

3.1 Economic and Social Impact Analysis - KPMG Report

The Blue Ridge Lumber Inc. and Ranger Board Ltd. Economic and Social Impacts Analysis Report was prepared by KPMG January 15, 1998. The report summarizes the social and economic contribution of Blue Ridge Lumber activities and expenditures in local communities. It is presented in four sections:

- Executive Summary
- 20 Years of Development
- Community or Social Impacts
- Economic Impacts

The economic and social impact analysis report was presented to Alberta Sustainable Resource Development and the Regional Forest Advisory Committee on April 28, 1998 as part of the Detailed Forest Management Plan.

One of the main messages of the report is the importance of timber supply to Blue Ridge Lumber and the resulting economic contributions to local communities.

3.2 Cultural Heritage Resource Study

A cooperative Cultural Heritage Resource study was initiated in mid-1996 by ANC Timber Ltd., Blue Ridge Lumber Inc., Millar Western Forest Products Ltd., and Slave Lake Pulp Corporation. This study was completed by Western Heritage Services Inc. of Saskatoon, Saskatchewan who has a strong background in heritage and archaeology services and management.

This joint study was initiated to incorporate social, cultural and heritage concerns into the management planning process so that significant locations can be properly documented and adequately protected. The four Companies wanted to move toward developing methods and processes for integrating heritage management into forestry practices, and to be in self-compliance with the Alberta Historical Resources Act which is currently administered by Alberta Community Development.

The ***"Heritage Management System for the Forest Industry in the Whitecourt/Slave Lake Region, Alberta"*** (Final Report February 1999) was submitted to Alberta Sustainable Resource Development on May 31, 1999 as part of the Blue Ridge Lumber Detailed Forest Management Plan. This report describes how the Company intends to manage the community cultural/heritage resource values. The report was also presented to the Regional Forest Advisory Committee on June 29, 1999 for review and comment.

This report has been used to develop the Chapter on Cultural and Heritage Resource Values. This report was also used to develop the ***Heritage Compliance Plan for the West Fraser Mills Ltd. Alberta Forestry Operations***, which was submitted June 20, 2001 to Alberta Community Development and approved November 5, 2001.

3.3 Fire History Study

In the spring of 1998, Blue Ridge Lumber initiated a fire history project to gain a better understanding of the historical natural range of variability in fire size, frequency and patterns that dominated the landscape. ***The Fire History Study of the Blue Ridge Lumber FMA Area*** was completed January 1999 by Marie-Pierre Rogeau, Wildland Disturbance Consultant. This study was presented to Alberta Sustainable Resource Development, Land and Forest Division, Forest Management Branch on May 14, 1999 and to the Regional Forest Advisory Committee on June 29, 1999 for review and comment.

Fire history studies have been the primary technique for learning about the fire regime of a specific ecosystem. An understanding of fire regimes is necessary to implement innovative and adaptive management strategies that can be adopted in a way that will approximate or emulate natural disturbance patterns. This study should assist future discussions regarding natural disturbance patterns, and landscape fuel management.

It is impossible to exclude fire totally from the landscape. Wildfires still remain a threat and the fire history study can provide guidelines for designating a fuel management plan that protects values at risk. By understanding causes of ignition and their spatial distribution on the landscape, areas with higher risks of ignition can be identified. Probabilities of burning of specific areas can be estimated by knowing prevailing burn patterns, topography, and fuel loading which characterize the region. The fire history study summarizes the factors and probabilities of ignition from lightning and man caused fires.

This report has been used to develop the Chapter on Fire Protection and it will assist the Whitecourt Fire Management District Landscape Fire Assessment Project.

3.4 Forest Health Strategies

Blue Ridge Lumber has retained the services of Bugbusters Pest Management Inc. of Prince George, BC to:

- Assist with the development of a forest health strategy for the Detailed Forest Management Plan.
- Develop a forest health training manual.
- Present an insect and disease training course for the entire Blue Ridge Lumber Woodlands staff on April 20, 1999.
- Monitor the bark beetle populations in the Blue Ridge Lumber log yard and provide recommendations for control measures.

A report titled “Forest Health Strategies” was submitted to SRD September 21, 1999 for review. Blue Ridge Lumber is concerned that the large devastating fires of May 1998 will initiate some ecological changes. An increase in the insect populations especially the bark beetles and spruce beetles is expected. This may lead to infestations and deterioration of green mature standing timber especially along the lakes and rivers and riparian areas that will require salvage operations. Recently, (June 1999) a large infestation of black army cutworms threatened the planting of millions of young spruce and pine seedlings in the Virginia Hills burn especially in the Hope Creek Gas Plant area.

The report was initiated due to a concern that the devastating Virginia Hills fire would bring a follow-up increase in insects and disease. The report assisted in the development of a Forest Health Training Manual and the development of a Forest Insect and Disease Course for the Woodlands staff. The report helped to develop the Insect and Disease Reporting Policy and the

BRL Weed Control Program. This report was also used to develop the Chapter on Insects and Disease.

3.5 Sustainable Forest Management-Fish and Wildlife Strategies

Blue Ridge Lumber has retained Westworth Associates Environmental Ltd., of Edmonton, Alberta to assist in the development of landscape planning strategies for fish and wildlife for the next Detailed Forest Management Plan. The study consists of three components or phases:

- Phase 1 – A report titled ***"Sustainable Forest Management - Fish and Wildlife Strategies"*** was submitted to SRD on September 21, 1999. This report assisted with initial discussions with SRD.

This led to the Ecological Land Classification and Wildlife Project initiated by Blue Ridge Lumber. BRL will continue to work with SRD to develop landscape planning strategies for fish and wildlife for the next BRL DFMP.

- Phase 2 – A report titled ***"Summary of Fish and Wildlife Resources in the Blue Ridge Lumber Inc. FMA Area"*** has been prepared and submitted to SRD for review and comment. This report is a summary of fish and wildlife resources and an assessment of wildlife habitat requirements, including rare, threatened and endangered species.

This report provides resource information that can be used to develop future landscape planning strategies for fish and wildlife for the next DFMP.

- Phase 3 – A ***"Habitat Suitability Index Model (HSI) for Moose"*** has recently been developed in cooperation with the Woodlands Forest Area Fish and Wildlife staff, and Westworth Associates Environmental Ltd. A copy of the preliminary report (October 2000) was provided to SRD.

3.6 Habitat Suitability Index Model for Moose

Blue Ridge Lumber has retained Westworth Associates Environmental Ltd., of Edmonton, Alberta to assist in the development of a habitat suitability index (HSI) model for moose. This project was completed in October 2000. The model is based on 3 key factors that influence habitat suitability for moose in winter, which is the most limiting time of the year. The 3 factors are:

- Forage availability
- Availability of security cover
- Proximity to all-weather roads

Each AVI polygon in the FMA area was evaluated using these 3 key factors. The overall HSI model assumes that forage availability is the most important factor affecting habitat suitability, but that the presence of nearby forest cover enhances suitability. However, suitability can be reduced if the habitat polygon occurs near an all-weather road.

Forage availability is based on shrub cover and composition. The model assumes that the suitability of habitat polygons increases as the cover of palatable shrub species increases. AVI has limited information on shrub cover so shrub cover was estimated using cover values derived from ecosite phase classification. For non-forested habitats, all shrubs were assumed palatable; however, forage availability in non-forested habitats was modified based on proximity to forest cover and amount of shrub closure.

Availability of security cover was based on crown closure, total conifer cover and stand height. The model assumes that the suitability of habitat polygons increases as conifer cover, stand closure and stand height increases.

Based on the proximity to all-weather roads the model assumes that the suitability of habitat polygons increases with increasing distance from roads.

The model output provides a landscape level assessment of habitat suitability for moose in the FMA area that can be used to help develop ecosystem based forest management practices. The output provides information on:

- Location and size of priority or high suitability habitats
- Habitat corridors
- Extent of habitat fragmentation

The model can be developed for current forest conditions and potential future forest conditions, thus providing a predictive tool to assess the outcome of various final harvest plans or annual operating plans.

3.7 Vegetation Landscape Assessment

Blue Ridge Lumber completed a vegetation landscape assessment to determine the species and age classes that are currently available on the FMA area. This documentation was submitted to SRD for review and comments on April 10, 2001. Comments were received May 9, 2001, and the document was revised and re-submitted July 31, 2001. This report summarizes the species group and age classes currently on the BRL FMA area.

The vegetation landscape assessments have been updated and included in the submission of this DFMP Timber Supply Analysis document.

3.8 Landscape and Stand Level Strategies for Retaining Representative Ecosystems

Blue Ridge Lumber has retained the services of Mr. John Przeczek of Interior Reforestation Co. Ltd. of Rocky Mountain House, Alberta to assist in the development of "***Landscape and Stand Level Strategies for Retaining Representative Ecosystems.***" The report has addressed current Blue Ridge Lumber operations and how they relate to approximating natural disturbance regimes. This report was submitted to Alberta Sustainable Resource Development for information on September 21, 1999.

This report was initiated to gain a better understanding of landscape and stand level ecosystem requirements. The report assisted in the development of landscape and stand level structure retention and debris management ground rules.

3.9 Soil Modeling Project

Blue Ridge Lumber has retained the services of Shawn Francis, M. Sc., P. Bio. of Applied Ecosystem Management Ltd. of Whitehorse, Yukon Territories to create a soil landscape map for the BRL FMA area using a variety of soil information sources. The existing information sources for BRL FMA area include:

- DEM (25 m – used to stratify the landscape into major slope, aspect and landform class)
- Peatland Inventory of Alberta, Vitt et al. (1998) (1:25,000)
- Alberta Surficial Geology mapping (1:25,000 – 83J, and 83 K map sheets)

- Soil Survey of the Whitecourt and Barrhead area. Alberta Soil Survey Report No. 27 (1969)

- Soil Survey of the Iosegun area. Alberta Soil Survey Report No. 43

- Exploratory Soil Survey of Alberta map sheets 83L, 83K, 83F and 83J. Research Council of Alberta Preliminary Soil Survey Report No. 64-2 (1963)

- Exploratory Soil Survey Report of portion of Valleyview-Whitecourt, Alberta Soil Survey Report No. 6 (1954)

The soil survey information was digitized onto 1:50,000 NTS hydro as the base coverage. Soil modeling techniques were used to fill in the NE corner of the FMA area, which had only exploratory soil information available. All soil maps were edge tied to give a relatively seamless soil map of the entire FMA area. The soil map created will form the basis for future ecosite mapping of the Blue Ridge Lumber FMA area. A Blue Ridge Lumber Soil Model Development Users Guide was developed June 19, 2000.

This project will assist the Company in operational planning. This project is also assisting in the Ecological Land Classification and Wildlife Project and the FORWARD Watershed research modeling project. The soil modeling project will assist with future development of an enhanced forest management program for the next DFMP.

Please refer to the two maps on the following pages that show the soil mapping data sources and the surficial geology of the FMA area.

BLUE RIDGE LUMBER INC.
FOREST MANAGEMENT AGREEMENT AREA

SOIL MAPPING DATA SOURCES

Swan Hills

No Alberta Soil Survey Report Available

Predictive Soil Mapping Completed by
Applied Ecosystem Management Ltd.

Alberta Soil Survey #43 (83K)*

Knapik, L.J. and Lindsay, J.D. 1983. Reconnaissance Soil Survey of the Iosegun Lake Area, Alberta. Alberta Soil Survey Report no. 43. Report and 4 maps at 1:126,700 scale (NTS 83K).

Alberta Soil Survey #27 (83J)

Wynnyk, A., Lindsay, J.D. and Odynsky, W. 1969. Soil Survey of the Whitecourt and Barrhead Area. Alberta Soil Survey Report no. 27. Report and 2 maps at 1:126,700 scale (NTS 83J, south half).

Fox Creek

Legend

- BRL FMA
- Paved primary highway
- Waterbody

Soil Mapping

- No AB Soil Survey Report
- AB Soil Survey #27
- AB Soil Survey #43

Date: September 1, 2005

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SUSTAINABLE FORESTRY INITIATIVE

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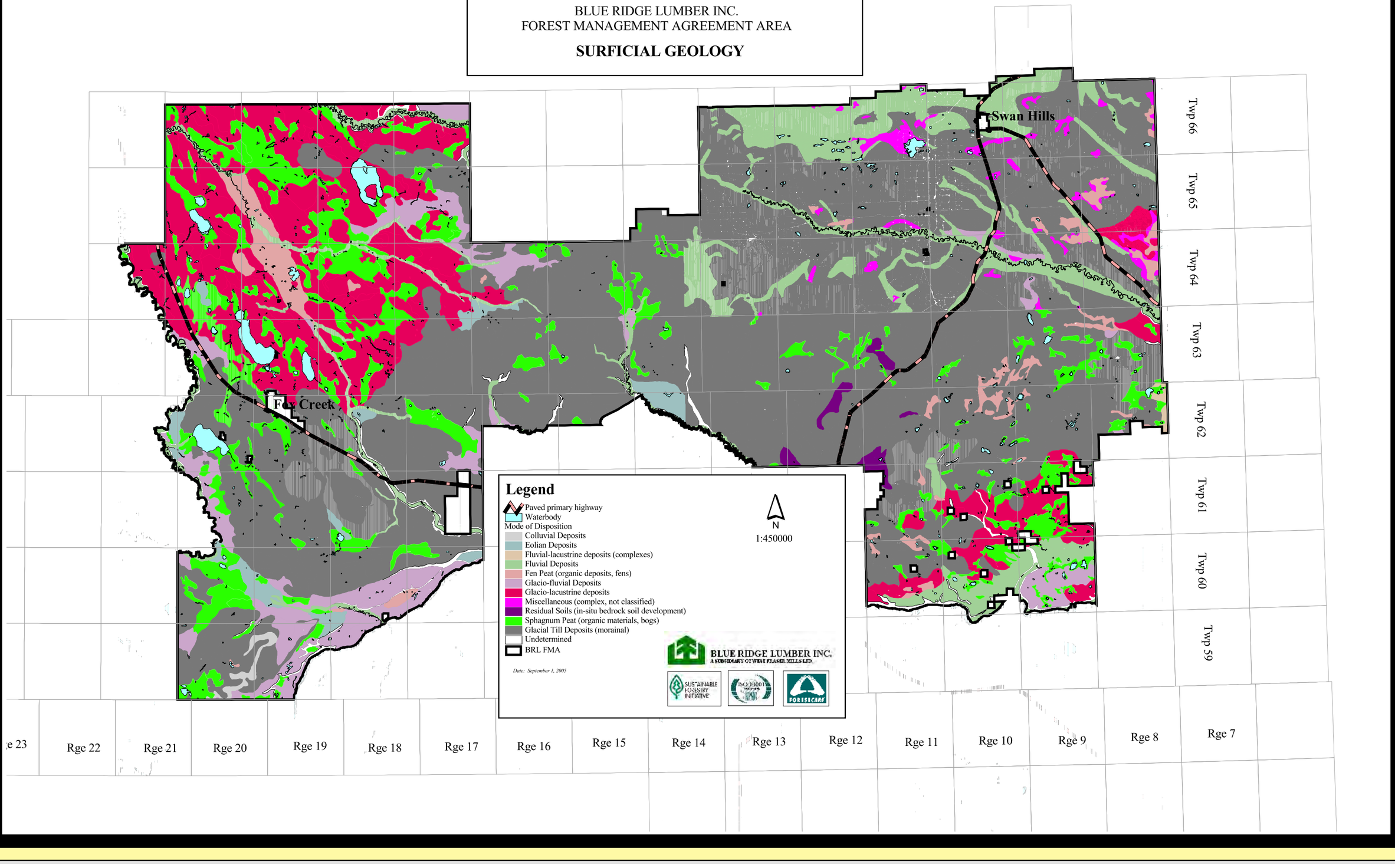
BLUE RIDGE LUMBER INC.
FOREST MANAGEMENT AGREEMENT AREA

SURFICIAL GEOLOGY



3.10 Ecological Land Classification and Wildlife Project

Blue Ridge Lumber has retained the services of John Beckingham, B.Sc., M.Sc, P.Biol. of Geographic Dynamic Corporation (GDC) to develop:

- An Ecological Land Classification and Mapping project for the BRL FMA area
- A Site Index Project and
- A Wildlife Habitat Evaluation and Analysis of Landscape Fragmentation and Connectedness.

An Ecological Land Classification and Mapping project for the BRL FMA Area
The purpose of the ecological classification project is to develop and map a full ecological classification at the ecosite phase level of the hierarchical classification. An obvious benefit to developing a predictive ecosite model and map is that information will be available at a stand level scale, with applications for site-specific management. This will enable forest managers to establish more precise planning and implementation objectives for forest operational activities. This project will also provide the basis for an ecological framework from which other ecologically based forest management planning models (vegetation competition, rutting hazard and erosion hazard) can be derived and evaluated using the predictive ecosite map units.

An ecologically based framework is important because it allows land managers to effectively evaluate landscape parameters and processes to develop an understanding of the ecological and biophysical interactions at the landscape level. This understanding facilitates the incorporation of ecologically based principles into forestland management practices to develop long-term ecologically and economically sustainable forestry procedures.

An integral part of this project consists of developing the ecological classification model and producing the relevant ecosite phase maps for the area. The predictive ecosite model will be derived from the ones developed for Millar Western Forest Products Ltd. and ANC Timber Ltd. The ecosite mapping project will also draw upon the existing ecosection mapping completed by Blue Ridge Lumber which forms an integral component of the modeling and mapping process.

Each specific resource parameter can be considered at any level of resolution, but some levels of resolution are better at capturing the inherent features of the relevant components than others. Using the SiteLogixTM system, ecological units will be defined through the analysis of soil, site, tree, topographic, productivity, and climate data. The basic methodology of the system is to utilize landscape variables to predict ecosites (Beckingham and Archibald 1996; Beckingham et. al. 1996).

Site Index Project
The purpose of the site index project is to collect additional plot measurements at the same time as crews are gathering the ecosite classification information. The collection of this additional information will assist in the development of a more accurate description of site index to be used for future growth and yield models, and silviculture management work.

The Wildlife Habitat Evaluation and Analysis of Landscape Fragmentation and Connectedness
The purpose of this project is to evaluate landscape patterns and configuration and its effectiveness to provide wildlife habitat as a component of the timber management strategy.

An evaluation of wildlife habitat would assess the static or current conditions of the landscape in terms of composition, configuration, fragmentation and connectedness. In addition, a dynamic assessment of forecasted conditions of the landscape at key points in time (e.g., 10, 20, 50, 100 and 200 years into the future) should also be determined based on future rates of harvesting and regeneration.

1. Assessment of the present state of wildlife habitat supply for a variety of wildlife guilds, which will be used to represent various habitat types (i.e., cover types and successional stages).
2. Assessment of the present state of landscape composition, configuration, fragmentation, and connectedness.
3. Dynamic assessment of wildlife habitat supply for a variety of wildlife guilds at each key point in time (e.g., 10, 20, 50, 100, and 200).
4. Dynamic assessment of landscape composition, configuration, fragmentation, and connectedness (e.g., 10, 20, 50, 100, and 200).

A holistic approach that will be applied to the Blue Ridge Lumber FMA area would be to evaluate habitat for wildlife guilds, or groups of wildlife species with similar habitat requirements. This approach deals with the maintenance of different cover types and seral stages across the landbase, in order to meet the habitat requirements for a diverse array of wildlife species. If succession rules and harvest sequencing models are applied to the polygons then wildlife habitat can also be determined for the landscape over time. This approach ties habitat evaluation procedures with the forecasted changes in landscape composition and configuration due to natural succession, harvesting, and reforestation. The first step is to provide a benchmark from which to measure and compare future landscapes. Thus, an evaluation of wildlife habitat will be conducted on the current landscape composition and configuration.

Essentially this evaluation can be done on an ecosite phase inventory with forest structure variables collected in the field and tied to ecosite phase.

In order to improve the ability to predict the habitat effectiveness for a given wildlife guild, we would include results from an analysis of the landscape composition and configuration. This will be done using a spatial analysis tool such as FragStats™. The results of this analysis will

increase the ability to forecast the habitat effectiveness of the landscape for wildlife guilds that may be sensitive to fragmentation and/or require landscape connectivity.

There are two levels of analysis; one involving the evaluation of wildlife habitat and the other analysis would focus on the composition and configuration of the landscape. Models will be developed combining landscape metric variables and habitat supply variables. These models will be applied at the ecosection or land management unit scale (roughly 1:100 000). This scale of ecological resolution facilitates comparison spatially and temporally across the landscape. This scale is conducive for strategic and operational planning.

In order to evaluate wildlife habitat within the Blue Ridge FMA area, a minimum number of variables are required:

- downed/coarse woody debris estimates
- estimates of snags, stubs and stumps
- regeneration assessments

Dead wood (snags, stubs and coarse woody debris) functions in a number of manners in forested ecosystems. It not only provides habitat for a range of invertebrate, vertebrate, and plant species, but it also affects soil erosion, slope movement, and nutrient availability and retention. Furthermore, variability in forest stand structure also creates a range of plant communities and habitat types used differentially by various species. The AVI inventory will provide a great deal of data about the horizontal and vertical stand structure characteristics; however understorey data will also be valuable. The regeneration data will also provide an estimate of the available browse for different species.

The stand structure variables will be tied to ecosite phases, and because of this link it would be efficient to collect the data while completing the ground truthing for the ecosite phase map development. The wildlife habitat data collection will be integrated with the ecological classification plots and would include:

- establishing a 30 m DWD transect, and collecting a tally of downed trees, tree species if possible or determining broader hardwood or softwood classes if the species cannot be determined, diameter class, decay class and any additional comments (e.g. wildlife use).

- count of snags, stubs and stumps within 10 m x 10 m area, diameter class, bark condition and decay class of standing dead trees, with density extrapolated for the entire stand.

- tally of regeneration, by species and height class, within a 5.64 m radius plot.

All three of the above projects were reviewed with staff of Alberta Sustainable Resource Development on June 15, 2001. An updated copy of the project proposals was provided to the staff of Alberta Sustainable Resource Development on August 13, 2001. Written confirmation

was received on February 28, 2002 from SRD indicating that the Department agrees with the approach and process that has been proposed, and that this project meets the intent outlined in the letter of May 11, 2001 (Poscente to Summers) regarding ecological land classification and wildlife assessment and strategy development. The endorsement of this project means that BRL is one step closer to meet the sustainable development goals and objectives to ensure that selected species and species guilds will not be put a risk. Completion of the three projects (ELC Mapping, Site Index and Wildlife Habitat Evaluation and Analysis) was completed in May 2003. This project may be used to assist in the development of the next DFMP and the development of an intensive forest management program.

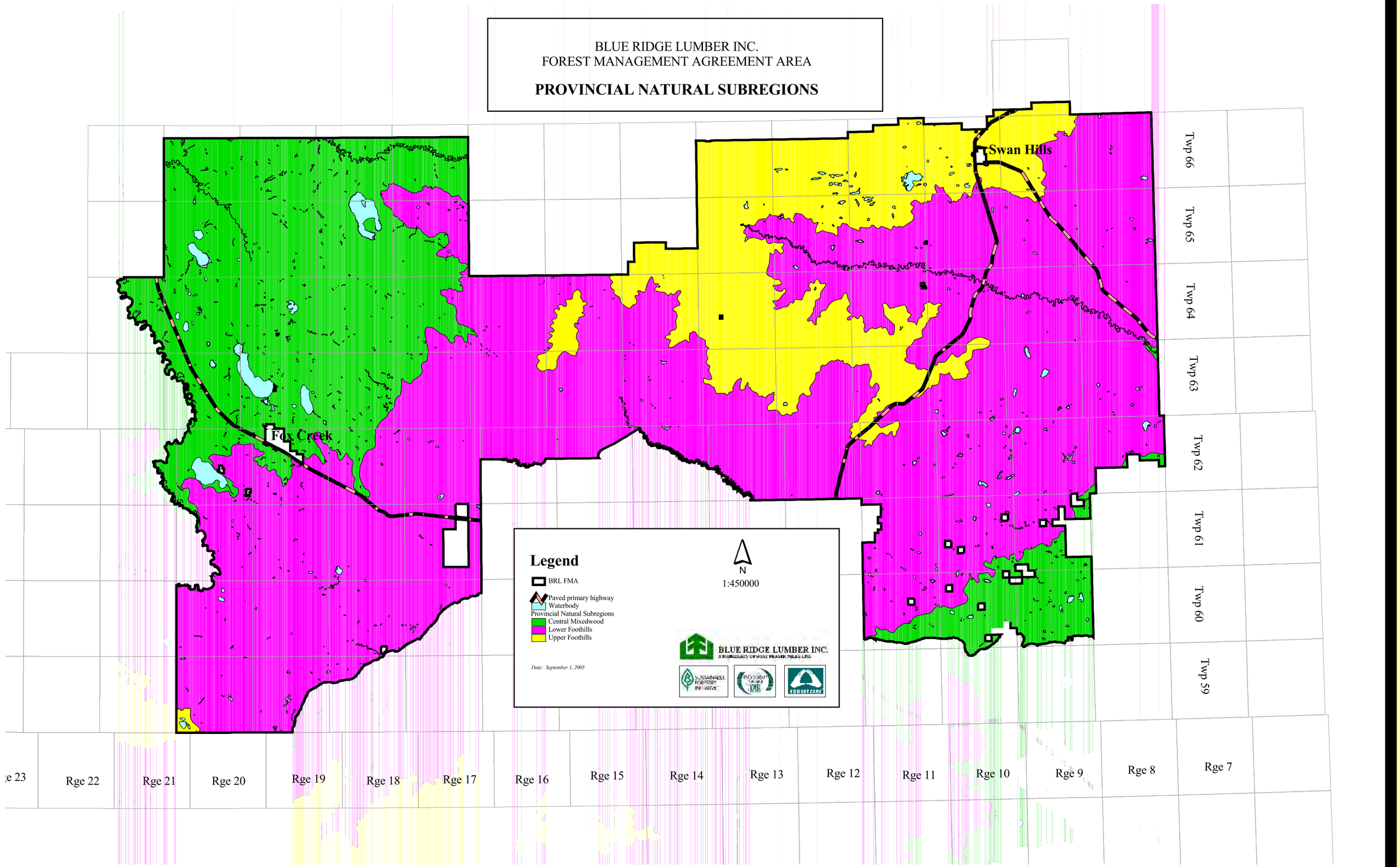
3.11 Natural Subregions

Please refer to the map on the following page that shows the current Provincial Natural Subregions for the Blue Ridge Lumber FMA area.

Alberta Sustainable Resource Development, Environment, Community Development (Parks) and Alberta Agriculture and Agri-Food Canada have collaborated on a substantial revision of the 1994 Natural Subregions for Alberta. This review used vegetation, topographic and climate information, Landsat ETM imagery, soils and ecological plot data, digital elevation models, as well as solicited information and comments from Industry and ecological experts to re-map the 1994 Natural Subregions at a scale of 1:250,000. The new natural subregions map is posted on the Department website at http://www3.gov.ab.ca/srd/.

BLUE RIDGE LUMBER INC.
FOREST MANAGEMENT AGREEMENT AREA

PROVINCIAL NATURAL SUBREGIONS



3.12 Coarse Woody Debris Assessment

Coarse woody debris (CWD) is a very 'big picture' issue. The quantities and qualities of CWD depend on the ecological processes of the region. In our area, weather patterns and subsequent fire return intervals and intensity are the most significant factors that control CWD.

The current forest is "not" natural. Under our current system of fire suppression and harvesting we have created a very fragmented and much older forest (on average).

We are in a very short (natural) rotation ecosystem. Fire return interval has been estimated at 37 years, but there is no distinction between stand replacing and ground fires.

Given that our current rotation ages of 80 and 100 years is significantly longer than the historic stand replacement interval of 37 to 74 years, and that in the first rotation our average stand age is approximately 130-140 years, it is highly likely that we are increasing significantly the amount of CWD on the forest floor. Given that the ecosystem components and processes that depend on CWD have been maintained naturally during the past 1000 years with a much shorter average stand rotation, one could recommend that we focus on methods and processes to reduce the amount of "unnatural" CWD that currently exists. Examples of this would be full utilization of larger stems, an aggressive prescribed burning program (with modified harvest boundaries), and a shortening of timber rotations (where feasible). In reality there are probably many other more important ecological components related to the differences between harvesting and fire that should be investigated. An example would be the implications of our current practices in building up extreme amounts of litter and organic matter on the forest floor. Without burning this off we are likely having severe negative impacts on the forest, compared to a natural fire dominated regime.

Blue Ridge Lumber retained the services of John Beckingham, B.Sc., M.Sc, P.Biol. of Geographic Dynamic Corporation (GDC) to develop a coarse woody debris assessment of the FMA area. SRD provided input into this proposal. A final report titled Coarse Woody Debris Assessment for the Blue Ridge Lumber Inc. FMA area April 2003 was provided to SRD. It is important to realize that the results of the report represent an assessment of the current status of CWD within the BRL FMA area at a current point in time. The results of the assessment support the knowledge that CWD is influenced by canopy type and stand age, hence the diversity and wide range of CWD volumes and decay class across the FMA area.

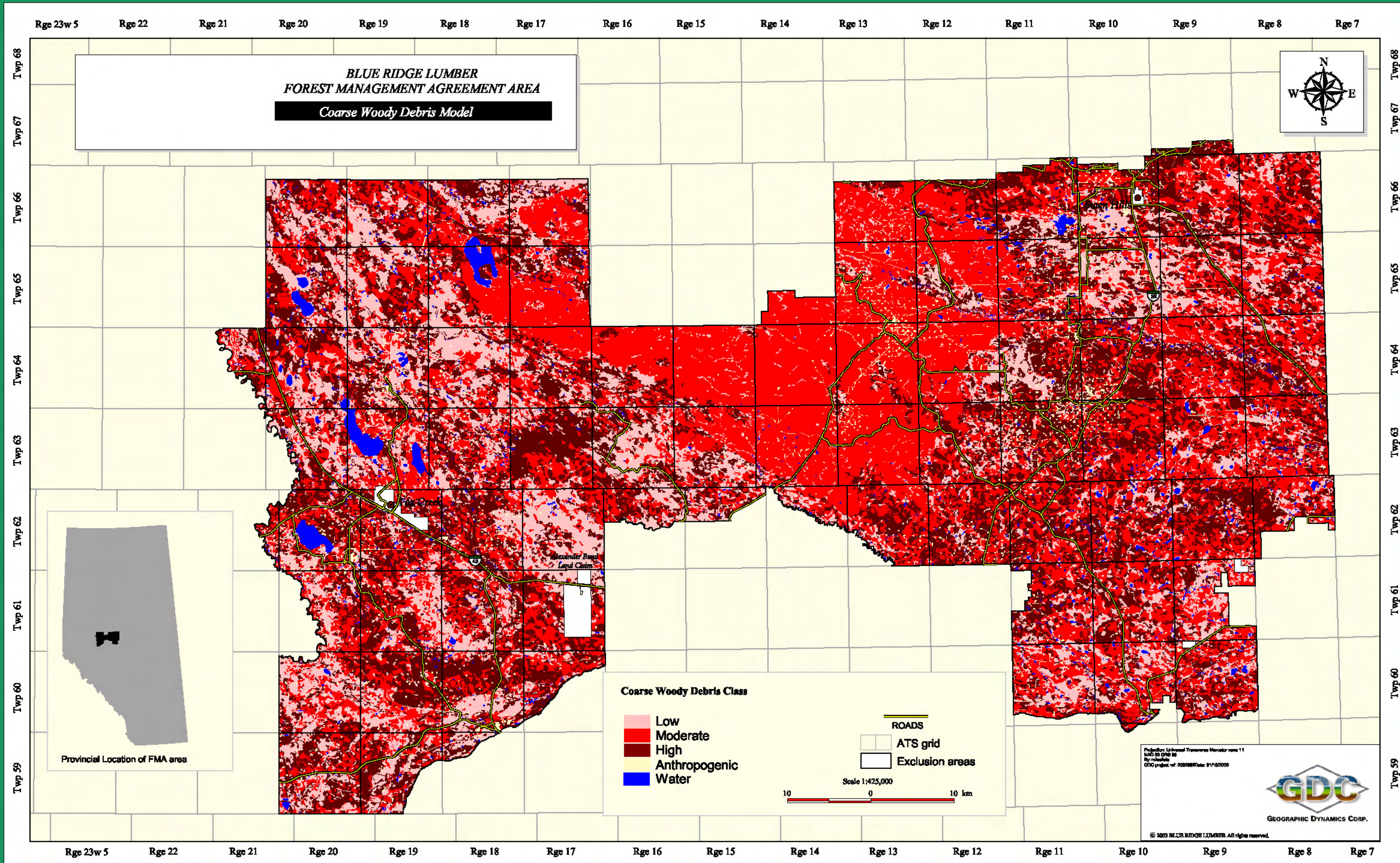
The results of the coarse woody debris assessment report indicate that CWD levels for the entire FMA area are classed at 43% moderate, 30% high and 22% low. The average total volume of CWD is 161.8 m^3/ha for the high CWD class, 100.9 m^3/ha for the moderate class and 58.9 m^3/ha for the low class.

All pure pine and white spruce and or balsam fir stands fell into the high CWD class. Other canopy types in the high CWD class included the deciduous and both of the conifer/deciduous mixedwood classes. The moderate CWD class includes recently burned stands, mature

deciduous stands and overmature pine/black spruce stands. The moderate class characterizes the portion of the FMA area that was consumed by the Virginia Hills Fire. The low CWD class is almost entirely composed of pine/black spruce, black spruce/tamarack and black spruce/pine stands. Overall there was a general increase in mean CWD volume with increasing stand age. This is a result of increased tree mortality and disturbances in older stands, as well as the accumulation of CWD over time. The distribution of CWD class varies across the FMA area. A wide range of decay classes is also seen across the FMA area with as equally a diverse range of volumes.

Because of this current diversity of CWD, Blue Ridge Lumber does not intend to manage for coarse woody debris or to develop or implement guidelines at this time, until further research information is available regarding the benefit of coarse woody debris to wildlife habitat. There is currently very little information available on CWD volumes and its relationship to forest management practices. Blue Ridge Lumber will attempt to leave coarse woody debris piles on cutblocks as appropriate, provided that it does not compromise the legislated provincial reforestation standard and the fire protection requirements.

The map on the following page shows the coarse woody debris assessment on the FMA area.


BLUE RIDGE LUMBER
FOREST MANAGEMENT AGREEMENT AREA
Coarse Woody Debris Model
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Twp 68
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Fox Creek
Provincial Location of FMA area
Coarse Woody Debris Class
Low
Moderate
High
Anthropogenic
Water
ROADS
ATS grid
Exclusion areas
Scale 1:425,000
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GDC
GEOGRAPHIC DYNAMICS CORP.
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3.13 Fisheries Inventory Swan Hills Whitecourt

The Blue Ridge Lumber FMA area was surveyed by RL and L Environmental Services Ltd. in 1995 and a copy of their report is titled ***"Fisheries Inventory for Swan Hills Whitecourt Integrated Resource Area."*** The information that is contained in this document has been used by BRL to develop a GIS resource information layer (Timing Constraints for Stream Crossings Map) to assist with annual operating plan development. For additional information please refer to the Fish and Wildlife Section in this DFMP and the map showing timing constraints for stream crossings.

3.14 Environment Canada Climate Data

The climate information has been gathered from Environment Canada's Canadian Monthly Climate Data. The information on the software has been collected for almost 30 years and provides a variety of information such as temperature, precipitation, wind and humidity for almost 6,000 locations across Canada.

Monthly averages were determined for temperature, precipitation, wind and degree days for fourteen locations within the FMA area, and the Whitecourt Airport weather station. A complete list of the lookout towers is located in the Fire Protection section of this plan.

This climate summary provides an excellent reference for climate conditions and a means to assess any changes. From this data, Blue Ridge Lumber is also able to plan our harvesting, road building, hauling, cone collection, and silviculture activities to best suit the expected weather conditions. The climate data also has the potential to support various management or decision support systems (DSS) models such as growth and yield, insects and disease, and wild fire.

Please refer to Appendix 4 for a summary of the climate data for each of the fourteen fire towers and the Whitecourt Airport. Data, which is not available on the Environment Canada Climate Database, is depicted in the accompanying documents as missing "M".

Temperature
The FMA area normally experiences relatively warm summers and cold winters, although there is often wide variation in temperatures across the region. The mean daily temperature averages about 1 to 2°C. During the summer months of May to September, the temperature average is about 10°C with July being the warmest month. The temperature hovers around -11°C during the winter months of November to February, with January being the coldest month.

Precipitation
The amount of precipitation varies from year to year and with location. However, there appears to be an overall greater annual precipitation with increasing elevation. Throughout the FMA area, the total annual precipitation is about 60 cm.

Most rainfall precipitation occurs during the months of May, June, July, August, and September and measures about 42 cm. The greatest rainfall occurs during the month of July, at about 10.5-cm.

December appears to be the month of greatest snowfall, receiving about 33.5 cm on average. The annual snowfall in the area varies greatly but averages about 180 cm measured at the Whitecourt Airport over a 15-year period.

Degree Days
Degree-days are "a measure of the departure of temperature for a day from some reference temperature" (Environment Canada, 1982). Degree-days are used in a variety of management practices ranging from cone collection to scheduling planting times and predicting plant growth and development stages.

Frost Free Days
The number of frost-free days within the FMA area is quite low and varies over the region. The Whitecourt Airport records an average of 104 frost free days over 12 years while the Fort Assiniboine Tower reports 78 frost free days over 7 years. The month of July is generally the only frost-free month. The first fall frost occurs about mid August while the last spring frost occurs about mid June.

Due to the short frost-free period, agriculture endeavors in the vicinity of the FMA area are mainly grazing. Some agriculture crops of barely and oats are grown but are limited due to the infertile soil conditions and the occurrence of frost.

Windspeed and Direction
Information on wind speed and direction was gathered from the Whitecourt Airport. The mean hourly velocity ranges from six to nine km/hr, with gusts reaching up to 90 km/hr. The most prominent wind direction is from the W-NW.

Climate Impact on Forest Management
Climate plays a major role in determining our forest management practices. The greatest influence of the changing and sometimes unpredictable climate is in our harvesting and reforestation practices. There are many occasions where our plans are very dependent on the weather conditions.

Harvesting is normally a year round operation within the FMA area, with a short shutdown period during May or June due to wet weather which makes access more difficult and the soil more vulnerable to compaction and degradation.

The transportation of logs to the mill is also largely determined by the climate. Summer hauling usually begins in mid June and works on a single shift basis depending on the weather until the end of November. The winter haul normally works around the clock from December to mid March. The haul program shuts down during spring break up due to impassable or poor road conditions. Because of this schedule, log yard inventories peak in mid March at about 350-400,000 m^3 and bottoms near the end of October at about 50-75,000 m^3.

The summer reforestation program is also dependent on cooperative weather conditions. Planting is carried out under contract in the spring and late summer to give seedlings a few months to grow before freeze up. Spring planting commences around mid-May once the frost leaves the ground and is usually completed by mid-June. Summer planting takes place between mid-July and the end of August. Development of planted seedlings is dependent on temperature, moisture and other climatic factors.

Seedlings of all conifer species can occasionally be damaged by frosts. Late spring frosts, early fall frosts and winter desiccation are probably the most important factors that can be detrimental to seedlings.

The use of herbicides is a common management tool for vegetation control in the Whitecourt area and is dependent on weather conditions. Seedlings must be properly hardened off before spraying commences in order to avoid damaging them.

Climatic injury to conifers in the form of winter drying or red belt is common especially to lodgepole pine on south and west facing slopes or ridges. The phenomenon of red belt injury has not been completely explained but it is most certainly climatological. It appears to be the result of rapid changes in winter temperatures. Severe damage has been noted in the foothills where pronounced Chinook winds occur. Fortunately climatic injury to pine (red belt) is less in the FMA area because of the milder Chinooks in this area. Some climatic injury has been reported along the Athabasca River Valley and in scattered pockets in the Swan Hills area (Annual Report of the Forest Insect and Disease Survey).

Wind damage or blowdown is always present to a certain extent, particularly in overmature, and exposed stands of timber. Strong westerly wind will create extensive blowdown damage. Blowdown along cutting boundaries and along road rights of way are particularly noticeable. Some blowdown is also apparent along watercourses. Blowdown loss can be minimized by placing a high priority on harvesting overmature decadent timber and the careful location and orientation of cutting boundaries in reserve blocks and along fringe timber, and conducting salvaging operations as quickly as possible when blowdown does occur.

Snow damage in trembling aspen, balsam poplar and conifer seedlings due to breakage by heavy wet snowfalls may occur but is not serious. Hail damage has occasionally stripped trees of leaves or needles and has been noted in small isolated areas within the Whitecourt Forest.

The Effects of Climate Change on the Forest

Climate change has been a much-discussed topic over the last decade. Although it is not certain or predictable to a great extent, it is possible that the climate is going through some changes. This could result in changes in the forest, which may require shifts in forest management.

A gradual warming trend appears to be occurring. Although more research and study is needed, if this trend continues there will be significant consequences. Higher temperatures may change the forest growth rate as well as the ranges of existing species. Species, which could only survive in certain areas, may be able to be used as an alternative species in other areas. At the far end of the spectrum, exotic species may be introduced. From an economic standpoint these changes may be positive.

There are other effects that are not so welcome. An increase in temperature may result in a growth in insect and disease epidemics and may introduce insects, which were previously of little economic consequence. Higher temperatures will increase the risk of fire.

As mentioned above, much more research is needed to determine if the climate is in fact changing dramatically and what the effects will be on the forest. The Canadian Forest Service Climate Change Network is currently studying these influences.

This Environment Canada Climate data assists the Company in planning operations in numerous ways, especially for vegetation management, cone collection, and seed orchard development. The data can also be used to assist in future modeling requirements.

3.15 Landscape Assessment Summary Matrix

The following is a summary of the landscape assessments undertaken by BRL to assist in the development of the DFMP.

Table 6: Landscape Assessment Matrix

Landscape Assessment Report or Project	Date Submitted	Description of Report or Project
Economic and Social Impact Analysis – KPMG Report	April 28, 1998	Summary of social and economic contribution of BRL activities and expenditures in local communities. Company employees and contractors make a significant contribution to the long-term stability of the economic, social and cultural activities of the surrounding local communities. One of the main messages of the report is the importance of timber supply to BRL. For additional information please refer to the Section on Economic and Social (Community) Stability and the Chapter on Blue Ridge Lumber Timber Supply.
Cultural Heritage Resource Study	May 31, 1999	This joint industry study was initiated to incorporate social, cultural and heritage values into the management planning process. This report has been used to develop the BRL Scarce Resource Reporting Policy. BRL also developed the follow-up West Fraser Heritage Management Plan to be in compliance with the new Alberta Community Development Act and regulations by July 1, 2001.
Fire History Study of the BRL FMA Area	May 14, 1999	BRL initiated this study to gain a better understanding of the historical natural range of variability in fire size, frequency and patterns that dominate the FMA area landscape. This report has been used to develop the Chapter on Fire Protection and it will assist the Whitecourt Fire Management District Landscape Fire Assessment Project.
Whitecourt Fire Management District Landscape Fire Assessment Project	Ongoing	FMA Holders are participating with SRD to use various fire models to identify areas of unacceptable wildfire threat and to develop strategies to reduce the wildfire threat in the next DFMP. BRL is also working with SRD and the Town of Swan Hills to fire proof the Town. Development of BRL Fire Control Program.
Forest Health Strategies	Sept. 21, 1999	This report was initiated due to concern that devastating V.H. fire would initiate an increase in insects and disease. The report assisted with the development of forest health training manual and the development of forest insect and disease training course. The report assisted with the development of the Insect and Disease Reporting Policy, and the BRL Weed Control Program. This report has been used to develop the Chapter on Insects and Disease.
Sustainable Forest Management – Fish and Wildlife Strategies	Sept. 21, 1999	This report assisted in the development of the HSI Model for Moose and the development of the ELC and Wildlife Habitat Project for the next DFMP.
Summary of Fish and Wildlife Resources in the BRL FMA Area	Nov. 8, 2000	This led to the Ecological Land Classification and Wildlife Project initiated by Blue Ridge Lumber. BRL will continue to work with SRD to develop landscape planning strategies for fish and wildlife for the next BRL FMA. This report provides information on the general habitat requirements of fish and wildlife species on the BRL FMA. Information can be used for future projects or modeling.
Habitat Suitability Index Model (HIS) for Moose	Completed October 2000	BRL worked with Westworth and Associates and SRD to develop an HSI model for moose calibrated to the BRL FMA area. The moose HIS model will assist with harvest planning in key wildlife ungulate areas of the FMA area.
Vegetation Landscape Assessment	July 31, 2001	This report summarizes the species group and age classes currently on the BRL FMA area.

Landscape/Stand Level Strategies for Retaining Representative Ecosystems	Sept. 21, 1999	Initiated to gain a better understanding of landscape and stand level ecosystem requirements. To develop landscape and stand level structure retention and debris management guidelines and ground rule.
Soil Modeling Project	See DFMP	This project developed complete soil map coverage of the FMA area from existing soil survey information. It is used to assist in operations planning as well as the Ecological Land Classification and Wildlife Project and the FORWARD Watershed Modeling Research project.
Ecological Land Classification and Wildlife Habitat Project	May 2003	Project includes an ecological classification and mapping project for the FMA area, a site index project, soil compaction and rutting potential, and a wildlife habitat evaluation and analysis of landscape fragmentation and connectedness. This project helped to assess unmerchantable black spruce in the timber supply analysis. This project may be used to assist in the development of the next DFMP and the development of an enhanced forest management program.
Coarse Woody Debris Assessment	April 2003	Development of the current assessment of coarse woody debris on the FMA area.
Fisheries Inventory Swan Hills Whitecourt Integrated Resource Area	ACA report 1995	Development of GIS layer (timing constraints for stream crossings map) to assist in operations planning.
Environment Canada Climate Data	Located in DFMP	Climate is summarized by 14 Fire Towers within the FMA area and the Whitecourt Airport. This information assists operations and possible future modeling requirements.

Blue Ridge Lumber has developed data information, GIS information and models that are being used for planning purposes. This landscape information also assists in preparing plans and maps required for compartment assessment and harvest design for operations. This information is continually being updated and revised.

Blue Ridge Lumber also supports research directly and indirectly, and strives for continuous improvement in sustainable forest management and environmental performance.