SYU R12

Detailed Forest Management Plan

2000 - 2015

Volume I

Chapter 1: General Description of the Sustained Yield Unit

Chapter 2: Forest Management Philosophy and the Planning Process

Chapter 3: Resource Management Goals

Weyerhaeuser Company Ltd.

Drayton Valley, Alberta

Foreword

This is Volume I of the Drayton Valley Detailed Forest Management Plan (DFMP) for the Sustained Yield Unit R12. Each Volume of the DFMP can be read as a freestanding report. However, the entire set of three Volumes together is the full DFMP. Each Volume has a separate Table of Contents, but for consistency they all share a common List of Acronyms and Glossary.

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ACRONYM LIST

AAC:	Annual Allowable Cut
AAFMI:	Alberta Advanced Forest Management Institute
ACE:	Allowable Cut Effect
AOP:	Annual Operating Plan
ASRD:	Alberta Sustainable Resource Development
AUM:	Animal Unit Measure
AVI:	Alberta Vegetation Inventory
CDWD:	Coarse Down Woody Debris
CNT:	Consultative Notation
CTP:	Commercial Timber Permit
CTPP:	Community Timber Permit Program
CTQ:	Coniferous Timber Quota
DFA:	Defined Forest Area
DFMP:	Detailed Forest Management Plan
DTM:	Digital Terrain Model
EFM:	Enhanced Forest Management
EMS:	Environmental Management System
ESIP:	Eastern Slopes Interdepartmental Planning
FAC:	Forest Advisory Committee
FMA:	Forest Management Agreement
FMU:	Forest Management Unit
FRIAA:	Forest Resource Improvement Association of Alberta
FRIP:	Forest Resource Improvement Program
FYHS:	Five-Year Harvest Schedule
GDP:	General Development Plan
GIS:	Geographic Information System
GPS:	Global Positioning System
HDA:	Harvest Design Area
IRM:	Integrated Resource Management
IRP:	Integrated Resource Plan
LRSYA:	Long Run Sustained Yield Average
MAI:	Mean Annual Increment

NIVMA:	Northern Interior Vegetation Management Association
PHA:	Pre-Harvest Assessment
PLFD:	Public Lands and Forests Division
PSP:	Permanent Sample Plot
PNT:	Protective Notation
PTA:	Post-Treatment Assessment
RET:	Rare, Endangered or Threatened
RLTAP:	Rolling Long Term Access Plan
SFM:	Sustainable Forest Management
SHS:	Spatial Harvest Sequence
SRD:	Sustainable Resource Development
SYU:	Sustained Yield Unit
TDA:	Timber Damage Assessment
WESBOGY:	Western Boreal Growth & Yield Co-Op
WeyFAC:	Weyerhaeuser Forest Advisory Committee

GLOSSARY

A

Adaptive management approach: A learning approach that states intent, provides monitoring and verification of intent, and makes changes to planned or intended activities as required.

Age Class: The classification of stands in a forest, or trees in a stand, into a series of ages (e.g. 0 to 4.99 = age class 1). For the DFMP, the age class of the AVI stands on the FMA area is defined by the stand age. The stand age is determined by using the DFMP base year minus the AVI origin plus five years.

Age Class Distribution: Distribution of the amount of area by age class and species group.

Aeolian: Well-sorted, poorly compacted, medium to fine sand and coarse silt sediment that has been transported and deposited by wind.

Aesthetics: The philosophy concerning judgments made about beauty.

Afforestation: The conversion of non-forested land to forested land through the practice of introducing commercial trees species to the site, through appropriate silviculture techniques.

Alberta Vegetation Inventory (AVI): A system for describing the quantity and quality of vegetation present. It involves the stratification and mapping of the vegetation to create digital data according to the AVI Standards Manual and associated volume tables.

Allowable Cut Effect (ACE): The allocation of anticipated future forest timber yields to the present allowable cut. The effect is typically based on several assumptions about the yields that may develop as a result of activities and decisions taken in the present. Shortening the rotation period, raising the increment, or both, increases the allowable cut.

Annual Allowable Cut (AAC): The volume of timber that can be harvested under sustainable forest management in any one year.

Annual Operating Plan (AOP): Plans prepared and submitted annually by timber operators describing how, where and when to develop roads and harvest timber. They describe the integration of operations with other resource users, the mitigation of the impacts of logging, the reclamation of disturbed sites and the reforestation of harvested areas.

Artificial regeneration: The creation of a new stand by direct seeding or by planting seedlings or cuttings.

Autecology: Growth characteristics of specific tree species.

B

Berm: A raised mound of soil.

Biodiversity: The variety, distribution and abundance of different plants, animals and other living organisms, the ecological functions and processes they perform, and the genetic diversity they contain at local, regional and landscape levels of analysis.

Bisequa: A dark beige colour.

Broadcast slash buildup: Slash scattered across a cutblock due to logging practices.

Broad Cover Group: Defined by the occurrence of coniferous as determined by AVI:

> Coniferous - stands with at least 80% conifer,
> Coniferous/Deciduous - stands with at least 50% and less than 80% conifer, and leading species conifer.
> Deciduous/Coniferous - stands with at least 30%, and no more than 50% conifer, and leading species deciduous.
> Deciduous - stands with less than 30% conifer.

Buffer: A protected strip of vegetated land beside roads, watercourses, mineral licks or other important features.

Buck-For-Wildlife Area: Area identified for wildlife habitat improvement.

C

Carrying Capacity: The number of individuals in any one species that can live in a habitat without degrading it.

Chert: A rock resembling flint.

Chinook: A warm dry wind that blows east from the Rockies.

Clear cut System: A silviculture system that removes an entire stand of trees from an area of one hectare or more, and greater than two heights in width, in a single harvest operation. With the clearcut system, the opening size and dimensions created are generally large enough to limit significant microclimatic influence from the surrounding stand.

Coarse filter management: Forest management at a landscape level or over broad regions aimed at maintaining a range of stands of different size, age and composition to provide habitat for all species.

Coarse Down Woody Debris: Sound and rotting logs and stumps that provide habitat for plants and animals, and a source of nutrients for soil structure and development. Generally classified as material greater that 10 centimeters in diameter.

Colluvial: Rock or soil material deposited as a result of gravity.

Common corridors: Linear land areas established to concentrate utilities and roads and to provide access for resource use and development.

Commercial Timber Permit (CTP): A timber disposition issued under section 22 of the Forests Act authorizing the permittee to harvest public timber.

Community Timber Program (CTP): A term used to describe a category of timber use that provides for those operators who harvest volumes through permits.

Coniferous species: Are cone bearing plants; pertaining to the class Gymnospermae. In this DFMP, it refers to the following tree species used in the processing facilities: white spruce, black spruce, Engelmann spruce, lodgepole pine, balsam fir, alpine fir, and tamarack.

Coniferous stands: Forest stands that consist predominately (> 70%) of coniferous tree species.

Coniferous Timber Quota (CTQ): A share of the allowable cut of coniferous timber within a forest management unit.

Constituency: A group or body that patronizes, supports, or offers representation.

Constraint: The restrictions, limitations, or regulation of an activity, quality, or state of being to a predetermined or prescribed course of action or inaction. Constraints can arise from the influence of policies, political will, management direction, attitudes, perceptions, budgets, time, personnel, data availability limitations, or complex interaction of all these factors.

Cordillera: A system of usually parallel mountain ranges together with intervening plateaus.

Criterion: A distinguishable characteristic of sustainable forest management; a value that must be considered in setting objectives and in assisting performance.

Cross-ditching: The practice of constructing ditches across roads to allow for the movement of water from one side of the road to the other.

Crown charges: Amounts paid to the Province as a royalty or in consideration of services rendered.

Crown land: Land owned by the Province of Alberta.

Cubic metre: Unit of measure of the volume of total wood contained in a tree or log, measured as one metre by one metre by one metre of solid wood.

Cumulative impact: Additive nature of individual effects.

Cut control period: A period of five consecutive forest management operating years or as otherwise agreed to by the Minister and a Company.

Cut sequence: The order of harvest operations in time and space.

D

Deciduous species: Belongs to the class Angiospermae. In this DFMP, it refers to the following tree species used in the processing facilities: trembling aspen, balsam poplar, and white birch.

Deciduous stands: Forest stands that consist predominately (> 70%) of deciduous tree species.

Deciduous Timber Allocation (DTA): Percentage of the deciduous annual allowable cut for a management unit, based on either volume or area.

Decommissioning: To take out of active service.

Deleterious: Harmful.

Denning sites: Areas where animals hibernate or raise their young.

Detailed Forest Management Plan (DFMP): A strategic long-term plan. It is the foundation for all forest management activities upon the FMA.

Digital Terrain Model (DTM): The computerized portrayal of a landform in three dimensions. It involves translating contour lines into digital format for use in the computer. It is also called digital elevation model.

Disposition: A lease, license, permit or letter of authority issued under provincial legislation for activities either surface or sub-surface.

Disturbance: A force that causes significant change in structure and or composition of a habitat.

Disturbance modeling: Computer program that models the degree of some type of disturbance.

Diversity: An assessment of the number of species present, their relative abundance in an area, and the distribution of individuals among the species.

E

Eastern Slopes Policy: A Policy for Resource Management of the Eastern Slopes. A policy covering about 90,000 km2 of the eastern slopes of the Rocky Mountains in Alberta. It was first released in 1977 and revised in 1984. The policy presents the Government of Alberta's resource management policy for public lands and resources within the region.

Ecology: The science that studies the interrelationships, distribution, abundance, and contexts of all organisms and their interconnections with their living and non-living environment.

Ecological integrity: Unimpaired, functional processes.

Ecoregion: A geographic area that has a distinctive, mature ecosystem on reference sites plus specified edaphic variations as a result of a given regional climate.

Ecosite: Ecological units that develop under similar environmental influences (climate, moisture, and nutrient regime). It is a functional unit defined by moisture and nutrient regime.

Ecosystem: A dynamic complex of plants, animals, and micro-organisms and their non-living environment interacting as a functioning unit.

Ecotone: A transition area between two communities which has characteristics of both as well as characteristics of its own.

Edaphic: Pertains to the soil, particularly with respect to its influence on plant growth and other organisms together with climate.

Edge: Where plant communities meet.

Endangered: In jeopardy of continuing existence.

Endangered, threatened and rare species: Classifications of the status of species populations as determined by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). Endangered indicates any indigenous species of fauna or flora that is threatened with imminent extirpation or extinction throughout all or a significant portion of its Canadian range. Threatened indicates any indigenous species of fauna or flora that is likely to become endangered in Canada if the factors affecting it vulnerability do not become reversed. Rare indicates an indigenous species of fauna or flora that, because of its biological characteristics or because it occurs at the fringe of its range, or for some other reasons, exists in low numbers or in very restricted areas in Canada but is not a threatened species.

Endangered wood: Timber that has or will be impacted by some natural or man-made process.

Enhanced forest management (EFM): Undertaking silviculture efforts that exceed Provincial requirements or liabilities.

Establishment period: The time elapsing between initiation of regeneration and its acceptance according to defined reforestation standards in the Timber Management Regulation.

Establishment stage: The early stage of reforestation where a crop of trees is initiated.

Even-aged Stand: A forest stand comprising trees with less than a 20-year difference in age.

Even flow: In harvest scheduling, the requirement that the harvest level in each period be equal to the harvest level in the preceding period.

Extensive silviculture: Silviculture practices, which at the minimum, meet current provincial reforestation standards and support the current annual allowable cut.

F

Fauna: Animal life.

Feature species: Those species that are rare, threatened, endangered or of social value.

Fine filter management: Specific habitat management for a single or a few species rather than broad management at a landscape level to maintain a range of habitat opportunities for all wildlife species (coarse filter).

Fire cycle: The number of years required to burn over an area equal to the entire area of interest.

Flora: Plant life.

Forecast: A prediction of future conditions and occurrences based on the perceived functioning of a forest system. A forecast differs from a "projection" which is a prediction of anticipated future conditions based on an extrapolation of past trends.

Forest: A collection of stands that occur in similar space and time.

Forest Access Zone: An area designated by the Provincial government that has specific access constraints in place.

Forest Advisory Committee (FAC): A collection of stakeholder representatives for Weyerhaeuser's FMA area that give advice and direction to the company and Alberta Sustainable Resource Development to ensure that integrated forest resource management is practiced, to sustain the health and integrity of the land and forests for future generations.

Forest connectivity: A measure of how well different areas (patches) of a landscape are connected by linkages such as habitat patches or corridors of like vegetation.

Forest health: As a specific condition, the term refers to a growing forest having many or all of its native species of plants and animals. As a management objective, it refers to maintaining or restoring the capacity of a forest to achieve health.

Forest Management Agreement (FMA): Agreement between the Province and a company to grow, harvest and reforest on a landbase tenure.

Forest Management Area (FMA): Refers to the tract of forest land over which a company has been given management rights for establishing, growing and harvesting trees on a perpetual sustained yield basis for a defined period of time.

Forest Management Plan: A generic term referring to both Forest Management Unit plans prepared by the government, and Detailed Forest Management Plans prepared by industry.

Forest Management Unit (FMU): A defined area of forest land located in the Green Area of the province designated by the Department to be managed for sustainable forest management.

Forested land: Land is considered to be forested if it supports tree growth, including seedlings and saplings.

Forests Act: Revised Statutes of Alberta 1980, Chapter F-16 as amended from time to time. It establishes the authority and means by which the Minister of Environment administers and manages timber on public land for sustained yield. It describes how timber allocations can be made on crown land and empowers the Minister to enforce the Act and associated regulations.

Fragmentation: The process of transforming large continuous forest patches into one or more smaller patches surrounded by disturbed areas. This includes loss of stand area, loss of stand interior area, changes in relative and absolute amounts of stand edge, and changes in insularity. This occurs naturally through such agents as fire, landslides, windthrow and insect attack. It also occurs due to anthropogenic activities such as timber harvesting, road building and wellsite development.

Free-to-grow: Stands that meeting stocking, height, and/or height growth rate as indicated by specifications or reforestation standards, and judged to be essentially free from competing vegetation.

Furbearer: Animals whose pelts and carcasses have a legal trade value.

G

General Development Plan (GDP): A five-year operating plan prepared, updated and submitted annually by the timber harvest operator.

Glaciofluvial deposits: Stratified outwash transported and deposited by glacial meltwaters that flowed upon, within, under, or beyond the glacier.

Goal: Broad statements of intent or direction relative to an aim, end or state of being to be achieved at some point in the future or maintained over a period of time.

Grazing disposition: An authorization issued under authority of the Public Lands Act for the purpose of domestic livestock grazing on Crown land.

Green Area: Area designated by the Province whose primary function is timber production.

Green-up: The process of re-establishment of vegetation following logging.

Green-up period: The time needed to re-establish vegetation after disturbance. Specific green-up periods may be established to satisfy visual objectives, hydrological requirements, or as a means of ensuring re-establishment of vegetation (for silviculture, wildlife habitat, or hydrological reasons) before adjacent stands can be harvested.

Ground rules: Provide direction to timber operators and employees of Alberta Sustainable Resource Development for planning, implementing and monitoring timber operations on the FMA. They highlight important management principles, define operating and planning objectives, and present standards and guidelines for timber harvest, road development, reclamation, reforestation and integration of timber harvesting with other forest users.

Growing stock: The sum (by number, basal area, or volume) of trees in the forest or a specified part of it.

Growth and yield: In timber management, the "yield" is the volume of wood available for harvest at the end of a rotation, usually measured as unit volume per unit area (e.g. Cubic meters per hectare). The "growth" is the rate and yield of biomass produced by plants regardless of function or use.

Guidelines: A set of recommended or suggested methods or actions that should be followed in most circumstances to assist administrative and planning decisions, and their implementation in the field. Note that guidelines cannot, by definition, be mandatory.

H

Habitat: The place where a plant or animal naturally or normally lives and grows.

Harvest area: A cutblock or cutover.

Harvest area orientation: Alignment of harvest area for some purpose, normally perpendicular to the prevailing wind.

Harvest design: A forest harvesting plan for a given area which may include in addition to the initially sequenced cutblocks, reserves for fish and wildlife or protection of unique sites, a reforestation program, watershed and riparian area protection, and roading and reclamation requirements.

Harvest design area (HDA): Geographically defined area for planning purposes

Hectare: Area of land measuring 10,000 square meters.

Hibernacula: A sheltered place where snakes spend the winter

Historical resources: Man-made objects of historical significance.

Hog fuel: A by-product of the processing facilities, which is used to generate heat and/or electricity. Hog fuel can be made up of bark, saw dust, and trim blocks.

Improved stock: The result of long-term tree breeding programs geared towards selecting for heritable characteristics that are desired.

I

Incidental: Having a minor role in relation to a more important thing or event.

Increment: Increase in volume of a particular tree or stand overtime.

Indicator: A measurable variable used to report progress toward the achievement of a goal.

Integrated Resource Management (IRM): A cooperative and comprehensive approach to the establishment of plans and to the delivery of benefits from the resource base in an efficient and effective manner.

Integrated Resource Plan (IRP): A regional plan developed by provincial government agencies in consultation with the public and local government bodies. It provides strategic policy direction for the use of public land and its resources within the prescribed planning area. It is used as a guide for resource planners, industry and publics with responsibilities or interests in the area.

Issue: A matter of wide public concern.

J, K & L

Lacustrine: Fine sand, silt, and clay sediments deposited on the lake bed or coarser sands that are deposited along a beach by wave action.

Landscape: A heterogeneous land area with interacting ecosystems.

Landscape diversity: The size, shape, and connectivity of different ecosystems across a large area.

Linear disturbance: The removal of vegetation in a narrow and generally long pattern, such as a road, pipeline, or seismic line.

Long run sustained yield average (LRSYA): The hypothetical timber harvest that can be maintained indefinitely from a management area once all stands have been converted to a managed state under a specific set of management activities.

M

Mean annual increment (MAI): The total increment to a given age in years, divided by that age.

Merchantable: A standard applicable to stands of timber or to individual trees indicating net usable volume.

Miscellaneous Timber Unit (MTU): Portion of a Forest Management Unit set aside for programs to make timber available to small operators.

Miscellaneous Timber Use Area (MTU): An area managed by Land and Forest Service to provide timber to operators who harvest small volumes of timber each year.

Mission: The reason an organization exists, the societal need it fulfils, and its functional focus.

Mixedwood stands: Stands containing both deciduous and coniferous species. Species content of either/or would be greater than or equal to 20% or less than or equal to 80% of the total cover in the canopy.

Monitor: The process of checking a situation or operation to validate.

N

Natural regeneration: The renewal of a forest stand by natural rather than human means, such as seeding-in from adjacent stands, with the seed being deposited by wind, birds, or animals. Regeneration may also originate from sprouting, suckering, or layering.

Natural process: Naturally occurring function, such as decomposition, fire, etc. Non-forested land: Land is considered to be non-forested if it does not support tree growth, including seedlings and saplings.

Non-productive land: Forestland currently incapable of producing a merchantable stand within a reasonable length of time.

Nutrient Cycling: The circulation or exchange of elements and compounds, such as nitrogen and carbon dioxide, between nonliving and living portions of the environment.

O

Objective: A clear, specific statement of result or conditions to be achieved through implementation of the management plan.

Old growth forest: Forest older than rotation age that contains live and dead trees of various sized, species, composition, and age class structure.

Operability: Classification of a forest site based on the potential to harvest the timber on this site. The physiographic characteristics and moisture conditions of the site are critical to this classification, as is the harvesting equipment available and the technology associated with the harvesting operation.

Operating guidelines: Rules that define forest management practices.

Order in Council: An order made by the Lieutenant Governor or Governor General by and with the advice of the Executive or Privy Council, sometimes under statutory authority or sometimes by virtue of royal prerogative Oriented Strand Board (OSB): wood composite product Own use permits: Small volume permit issued to individuals for their own use, e.g., post and rails.

P

Patch: A relatively heterogeneous non-linear area that differs from its surroundings.

Patch retention: Islands of timber retained within a generally clearcut area.

Periodic Allowable Cut: The total of the annual allowable cuts approved for a five-year cut control period.

Permanent roads: Roads that will be in use for more than two years.

Permanent sample plot (PSP): Plots established for long-term timber growth and yield studies.

Philosophy: General understanding of values.

Physiography: Pertains to the physical landform characteristics, also known as geomorphology.

Policy: A course of action adopted or proposed; prudent conduct.

Potentially productive: A site that is capable of growing trees but is currently void of commercial tree species.

Predictive modeling: Computer models that forecast outcomes of actions.

Pre-harvest assessment: Survey of area prior to harvest to determine pre– and post-logging requirements, such as season of harvest, reforestation tactics, etc.

Prescribed burning: Burning planned to provide some type of desired results.

Principle: A formal statement that provides a basis for sustainable forest management policy and that serves as a fundamental guide to action.

Productive landbase: Area deemed to support forest growth.

Public Lands and Forests Division (PLFD): A part of the Department of Alberta Sustainable Resource Development.

Q

Quadrant Volumes: Five year's accumulation of AAC.

Quota: A form of timber disposition defined by the Forests Act that allows for the allocation of a portion of the sustainable harvest level determined for a given forest management unit.

Quota Certificate: A certificate that entitles the owner to a percentage share of the AAC of a forest Management Unit. This percentage is translated into a fixed roundwood volume.

R

Range of natural variability: The range of results that have occurred naturally.

Range of variability: Characterizes fluctuations in ecosystem conditions or process over time. It can describe variations in diverse characteristics such as tree density, vertebrate population size, water temperature, frequency of disturbance, rate of change, etc.

Rare: Few.

Reference ecosite: Site having average characteristics.

Reforestation: Process of reestablishing a crop of trees.

Reforestation deletion: Stands, which are deleted from the timber harvesting landbase due to their relatively low productivity combined with the difficulty of reforesting the sites.

Reforestation lag period: The time between completion of timber harvest operations and the establishment of a regenerated stand, based on current procedures for evaluating successful stand establishment.

Refugium: Large areas free from trapping and land-use activity.

Regeneration: The renewal of a forest or stand of trees by natural or artificial means.

Retention period: The length of time between harvesting passes.

Right-of-way: A strip of land over which a power line, railway line, road, or other linear disturbance extends.

Riparian areas: Those terrestrial areas where the vegetation complex and microclimate conditions are products of the combined presence and influence of perennial and /or intermittent water, associated high water tables, and soils that exhibit some wetness characteristics.

Roll-back: Strippings and debris returned to disturbed areas for reclamation purposes.

Rotation: The period of years required to establish and grow timber crops to a specified condition of maturity.

Rotation Age: The planned number of years between regeneration of a forest stand and its final harvest.

S

Salvage Cut: A cutting method to remove dead or damaged trees with merchantable wood.

Scarification: Silvicultural practice involving the mechanical disruption of the ground surface to expose mineral soil.

Sedimentation: Deposit of waterborne material.

Selection harvest: An uneven-aged silvicultural system in which selected trees are harvested individually or in small groups at periodic intervals.

Selective cutting: A harvest practice in which only trees of a certain species with a specified diameter and/or value are harvested.

Sensitivity analysis: An analytical procedure in which the value of one or more parameters is varied and the changes that this produces are analyzed in a series of iterative evaluations. If a small change in a parameter results in a proportionately larger change in the results, the results are said to be sensitive to the parameter.

Seral stages: The stages of ecological succession of a plant community from young to old. This is the characteristic sequence of biotic communities that successively occupy and replace each other.

Silviculture: The theory and practice of controlling the establishment, composition, structure and growth of forests.

Silviculture regimes: Tactics to establish a crop of trees.

Single-tree retention: Process of leaving single trees standing in generally clearcut area.

Site index: A measure of forest site productivity expressed as the average height of the tallest trees in the stand at a defined index age, typically less than the planned rotation ages. For this DFMP, a site index age of 50 years was used.

Site preparation: Mechanical preparation of forest soils for reforestation purposes.

Site productivity: The mean annual increment in merchantable volume which can be expected for a forest area, assuming it is fully stocked by one or more species best adapted to the site, at or near rotation age.

Slash hazard reduction: Process to remove or reduce the buildup of logging slash.

Snag: A standing dead tree from which the leaves and most of the branches have fallen.

Spatial database: Data referenced to a set of geographical coordinates and encoded in digital format so that they can be sorted, selectively retrieved, statistically and spatially analyzed. The different data planes can be overlaid in virtually any order.

Special Places: A Government of Alberta initiative committed to the establishment of a network of Special Places that represent the environmental diversity of the province's six natural regions (20 subregions). The program encompasses a balanced approach to preservation, outdoor recreation, heritage appreciation, tourism and economic development.

Stand: A continuous group of trees or other growth occupying a specific area and sufficiently uniform in composition, age, arrangement, and conditions as to be distinguishable from the forest or other growth on adjoining areas.

Stand structure: The various horizontal and vertical physical elements o the forest. The physical appearance of canopy and subcanopy trees and snags, shrub and herbaceous strata, and down woody material.

Stand Tending: Activities such as thinning, spacing, removal of diseased trees, and weed or brush control, carried out in already established stands.

Stewardship: Obligation to manage.

Stewardship Report: A report that accounts for all activities, undertaken as a steward of a given article, resource, area or process, related to strategies to achieve stated stewardship goals. Measures of performance are included and linked to plans that express the desired goals.

Stocking: A measure of the proportion of an area occupied by trees/seedlings, expressed in terms of percentage of occupied fixed area sample plots.

Strata: A multitude of layers or groups.

Strategy: Statement of broad activity designed to achieve the goals or objectives.

Stratum: A single layer or group.

Sub-regional Integrated Resource Plans: A system of Cabinet approved plans incorporating a cooperative and comprehensive approach to decision making relative to the allocation and use of Crown land and resources.

Succession: The replacement of one plant community by another in a progressive development towards climax vegetation.

Successional patterns: Evolutionary process of vegetation stages.

Sustainable development: Development of a resource while maintaining other values.

Sustainable forest management (SFM): The maintenance of the ecological integrity of the forest ecosystem while providing for social and economic values such as ecosystem services, economic, social and cultural opportunities for the benefit of present and future generations.

Sustainable timber management: Managing the forest to provide a perpetual supply of timber now and into the future.

Sustained-yield timber management: The yield a forest can produce continuously at a given intensity of management.

Sustained Yield Unit (SYU): Unit of land used to determine an annual allowable cut. In this DFMP, SYU equals FMU.

T

Tactic: A method to achieve something.

Temporary road: Temporary roads are those that are part of a cutblock, or connect cutblocks and are built, used and reclaimed before expiry of the AOP, or reclaimed within two years of construction.

Temporary sample plot (TSP): an area of established size used in the measurement of trees and other physical characteristics.

Threatened: Class of plant or animal life under pressure to maintain existence.

Timber harvesting landbase: The timber harvesting landbase is the portion of the total land area of the FMA that can be considered to contribute to and be available for long-term timber supply. It is the landbase remaining after deductions for areas that cannot, should not, or will not be managed for timber production.

Timber management: The activity involving the allocation of forested lands for harvesting of the timber on that land. Timber management may involve planning, road building, logging extraction of merchantable timber for processing off-site, and varying intensities of silvicultural activity to encourage another stand of trees to grow back. Timber management is an important subset of forest management, but it is not an equivalent activity.

Timber Management Regulation: The legislative stature that describes the mechanism and regulations by which the forested lands of Alberta are managed.

Timber Operations: Includes all activities related to timber harvesting including site assessment, planning, road construction, harvesting, reclamation and reforestation.

Tufa: A porous rock composed of calcium carbonate and found around mineral springs.

U

Understorey: Those trees or vegetation in a forest stand below the main canopy level.

Understorey protection: Avoidance of damaging immature tree species during harvesting operations.

Uneven aged stands: Stands in which the trees differ markedly in age, usually with a span greater than 20 years.

Ungulate: Hoofed animal.

Unique areas: Sites that contain natural features or special values for wildlife and plant species. Also includes historical and archeological significant areas.

Unique ecological sites: Areas supporting rare species or processes.

Utilization standards: Standards establishing stand and tree merchantability.

V

Value: A principle, standard, or quality considered worthwhile or desirable.

Viewshed: The visible area, as it appears from one or more viewpoints.

Vision: Foresight.

Volume table: A table, graph or equation showing the estimated average tree or stand volume corresponding to selected values of more easily measured tree or stand variables.

W, X, Y & Z

Water source areas: That portion of a watershed where soils are water saturated and/or surface flow occurs and contributes directly to stream flow.

Water yield: The quantity of water derived from a unit area of watershed.

Watershed: An area of land that collects and discharges water into a single creek or river through a series of smaller tributaries.

White Area: Forested area in the Province managed primarily for grazing, while also managing for some sustainable timber production. It also includes a mixture of private and Crown land.

Wood chip direction: Provincial direction of byproduct of timber manufacturing to specific pulping facilities.

Woody debris: Live or dead, standing or downed, woody material left on a site after logging.

Yield Curve: Graphical representation of a yield table.

Yield Table: A summary table showing, for stands (usually even aged) of one or more species on different sites, characteristics at different ages of the stand.

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   b. Alberta Conservation Association
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Post-2000 Plan Submission to Final Submission 2005

In the summer of 2001, SRD formally responded to the original submission. Since that time, the following individuals have also been involved in updating and reviewing the revised submission of the Drayton Valley DFMP:

- Greg Behuniak, Weyerhaeuser Alberta
- Rick Watson, Weyerhaeuser Alberta
- Luigi Morgantini, Weyerhaeuser Alberta
- Bruce Macmillan, Weyerhaeuser Alberta
- Norm Volk, Weyerhaeuser Alberta
- Pat Wearmouth, Weyerhaeuser Alberta
- Wendy Crosina, Weyerhaeuser Alberta
- Geoff Clarke, Timberline Forest Inventory Consultants
- Janis Braze, Timberline Forest Inventory Consultants
- Chris Hampel, Timberline Forest Inventory Consultants
- Glenn Buckmaster, MSC, (1053877 Alberta Limited)
- Gyula Gulyas, J.S Thrower & Associates Ltd.
- Craig Mistal, J.S Thrower & Associates Ltd.
- Steve Reed, Silvacom Ltd.
- Brad Kilgour, Weyerhaeuser Pembina
- Fulton Smyl, Weyerhaeuser Pembina
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- Jim Allen, Fish and Wildlife Division, SRD, Rocky Mountain House
- Beverly Wilson, SRD Edmonton
- Nadine Pedersen, SRD Edmonton
- Darren Aitkin, SRD Edmonton,
- Grant Klappstein, SRD Edmonton
- Debbi Chapman, Foothills Forestry Consulting Ltd.
- Jerry Baker, Tall Pine Timber Limited, Lodgepole, Alberta
- Dale Hansen, Hansen Forest Products, Eckville, Alberta
- Ian Whitby, Tolko Industries, Slave Lake, Alberta

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RPF# 398.

EXECUTIVE SUMMARY

This Detailed Forest Management Plan (DFMP) has been developed for the Sustained Yield Unit (SYU) R12. This includes the Forest Management Agreement (FMA) Area for FMA # 8500023 (recently renewed to FMA # 0500042), most grazing dispositions (i.e. grazing permits, licenses and leases but excluding Grazing Reserves) imbedded within the boundary of the FMA, and several small areas adjacent to the eastern boundary of the FMA. This plan does not include either of the Sunchild (IR#202) or O'Chiese (IR#203) Indian Reserves, or Crimson Lake Provincial Park.

The DFMP utilizes a comprehensive and detailed land and vegetation inventory (Alberta Vegetation Inventory) updated to 2004. The FMA Area straddles the Lower Foothills, Upper Foothills and Subalpine natural sub-regions. Elevation ranges from 760 metres in the northeast to 2620 metres in the southwest.

The Gross SYU Area (includes the legally defined FMA area and the non-FMA areas) is approximately 520,000 hectares. About 60% of the total area has been classified as productive landbase. Forest growing stock is one-third deciduous and two-thirds coniferous. Deciduous and mixedwood forests predominate in the eastern parts of the FMA Area, and coniferous forest in the western portions.

The term of this plan is from November 18th, 2000 to April 1st, 2015 or until replaced with another plan. The timber operating year is defined as May 1st to April 30th.

This is the second DFMP developed for the FMA. This plan will replace the Preliminary Forest Management Plan approved by Alberta on April 29th, 1998. It will provide direction for all forest management activities contained within the Sustained Yield Unit. A team of Weyerhaeuser resource managers participated in the development of this Plan, with additional participation by Alberta Sustainable Resource Development.

Throughout the development of the DFMP, Weyerhaeuser followed the Public Involvement Plan for FMA 8500023, July 31st, 1998. The Public Involvement Plan consisted of three distinct phases. Phase One was designed to facilitate input and reviews towards the establishment of the DFMP goals. Phase Two facilitated the input and review towards the development of specific strategies and objectives that best met the intent of the above DFMP Goals. The third and final phase of the Public Involvement Plan involves ongoing consultation regarding operational activities with stakeholders and members of the public after the DFMP has received approval and implementation has begun. As well, Weyerhaeuser's ongoing Forest Advisory Committee (FAC) has been involved extensively in the public involvement process during the development of the DFMP.

The DFMP text (including appendices and maps) includes three volumes, with a total of 8 Chapters.

Volume I

Chapter 1 - General Description of the FMA and surrounding area: provides a comprehensive description of all physical aspects of the FMA and the surrounding areas included in the SYU. This includes physical features (ecological information, elevation, topography, soils), landscape patterns (age class distribution, forest types, patch sizes), fish and wildlife, water, historical resources, anthropogenic uses, and forestry manufacturing facilities.

Chapter 2 – Forest Management Philosophy and the Planning Process: provides a review of Weyerhaeuser corporate hierarchy and company management philosophy, including vision, values, policy and principles.

Chapter 3 – Forest Management Goals: A total of 8 goals were derived reflecting values identified during the early part of the planning stage. These 8 goals are:

1. Fibre Supply: Ensure the Weyerhaeuser's Drayton Valley facilities remain globally competitive in terms of fibre supply from the FMA area.
2. Forest Diversity: Maintain forest diversity at the stand and landscape level in terms of structure, composition, and function.
3. Ecosystem Capacity: Maintain the productive capacity of the forest.
4. Watersheds: Maintain the integrity of watersheds.
5. Public Accountability: Improve public acceptance of Weyerhaeuser's Drayton Valley forest management activities.
6. Resource Integration: Integrate with the management activities of other resource users.
7. Unique Sites: Protect unique archeological and ecological sites.
8. Increasing the Timber Supply: increase the sustainable harvest level of deciduous and coniferous timber from the FMA area.

Volume II

Chapter 4 – Timber Supply Analysis: provides a comprehensive review of the determination of the net productive landbase, the development of yield curves, the calculation of Annual Allowable Cuts (AACs), and the spatial harvest sequence for Sustained Yield Unit R12, as well as associated AACs to be applied to the FMA, DTAs, CTQs and CTPPs.

Volume III

Chapter 5 – Forest Management Strategies and Objectives: Outlines the corresponding strategies, objectives and tactics to meet the goals described in Chapter 3.
Chapter 6 – Implementation Plan: Selected strategies are expanded upon to better describe how the Approved DFMP will be implemented throughout its term.
Chapter 7 – Monitoring: Description of the annual and stewardship reports. All objectives have been assigned an indicator with an associated variable.
Chapter 8 – Future Considerations: Reviews selected opportunities that will be reviewed with future DFMPs in mind.

The proposed Annual Allowable Cut levels for the Sustained Yield Unit are: 489,291 m3/year of coniferous and 286,149 m3/year of deciduous (Table E 1). These harvest levels would be divided between Weyerhaeuser and the different timber operators, as outlined in the table below (Table E 2).

Table E 1 AAC for Sustained Yield Unit (SYU) R12 - FMA and Non-FMA Landbases

Source	Coniferous AAC	Deciduous AAC
FMA	466,881 (95.42)	265,747 (92.87%)
Non-FMA	22,410 (4.58%)	20,402 (7.13%)
Total	**489,291 (100%)**	**286,149 (100%)**

Table E 2 Allocation of Volume in SYU R12

	Company	Coniferous AAC (m^3/yr)	Deciduous AAC
From FMA	Weyerhaeuser Company Limited FMA 8500023	421,025	263,090
From SYU	Tall Pine Timber Co. Ltd. CTQ R120002 (R1Q4)	15,806	NA
From SYU	Tall Pine Timber Co. Ltd. CTQ R120003 (R1Q5)	3,269	NA
From SYU	Tall Pine Timber Co. Ltd. CTQ R120004 (R4Q11)	11,254	NA
From SYU	Dale Hansen Ltd. CTQ R120001 (R2Q7)	8,600	NA
From FMA	Lodgepole Community Timber Program	4,000	NA
From FMA	Community Timber Permit Program	4,669	2,657
From non-FMA	Weyerhaeuser Company Limited DTA R120001	NA	20,402
From non-FMA	Weyerhaeuser Company Limited CTQ R120005	20,669	NA
	Total SYU AAC	**489,291**	**286,149**

1 GENERAL DESCRIPTION OF THE SUSTAINED YIELD UNIT

1.1 History of Weyerhaeuser's Drayton Valley Forest Management Agreement (FMA) Area

1980

The Weyerhaeuser Drayton Valley FMA had its origins in what was called the Brazeau Timber Development Area (TDA). In 1980, the Province requested proposals for forest industry development for the forest resource generally located between Rocky Mountain House and Drayton Valley. The TDA was divided into two major "Blocks" known as the O'Chiese Block (primarily deciduous timber) and the Nordegg Block (primarily coniferous timber). Public hearings were held on the proposals in 1982 but no forest industry development occurred right away.

1985

Pelican Mills Ltd. was awarded the original FMA Area in 1985 in exchange for a commitment to build and operate an oriented strand-board (OSB) plant in Drayton Valley. The FMA Area was loosely based on the former O'Chiese Block of the Brazeau TDA. Wood requirements were met from the FMA Area, the purchase wood program and from Deciduous Timber Allocations outside the FMA Area.

1987

A Preliminary Forest Management Plan was submitted in February 1987 and subsequently approved by the Province in October. Mill production began in March 1987 and timber harvesting operations in the same year.

Pelican Mills purchased Coniferous Timber Quotas and built a dimensional lumber sawmill-planer complex. It was a logical progression for the company as much of the deciduous timber was in mixed stands with conifer timber, and the conifer timber supply in the region was still under-utilized. Similarly, wood supply for the sawmill was procured from the FMA, Coniferous Timber Quotas and purchased sources.

1990

A Detailed Forest Management Plan (DFMP) for the original FMA Area was submitted to the Province in accordance with the requirements of the FMA, and was subsequently approved in June of 1994. The period between the submission of the DFMP and its approval was unusually long, mainly because this was a time of evolving expectations for forest management plans and for the approval process, including public involvement. Thus three drafts were required, each with formal reviews, to satisfy both the company and the Province. The company also established its first public Forest Advisory Committee in 1990.

In 1990 Weyerhaeuser Company Ltd. acquired Pelican Mills Ltd. There were no significant changes as a result of the takeover by Weyerhaeuser although the company continued to seek additional Crown coniferous wood supplies in the form of Quotas. About the same time, the region experienced substantial expansion in the forest sector and virtually all-remaining Crown timber resources became committed.

1996
In 1996, the company submitted to the Province what was termed a Status Report for the FMA Area. The report was essentially a summary of forest management activities, reporting on the company's performance against the FMA requirements and providing some direction for future forest management plan development. The Status Report was submitted to the Province for information and for public reading.

1997
As virtually all of the Crown timber resource in the region was fully committed by 1997, it was a logical progression for Weyerhaeuser to seek to have its wood supply areas combined into one FMA Area. This involved determining which portions of the company's Quota areas in the R-3 and R-4 forest management units were required to support the company's AAC, and then amalgamating these areas with the original FMA Area. This would provide the company with greater security of supply and a better opportunity for forest management. The Province in return would receive a greater commitment from the company towards resource management. The FMA area was formally expanded in 1997.

1998
A Preliminary Forest Management plan for the amended FMA Area was submitted in January and subsequently approved in April 1998, and forms the basis for this DFMP submission.

2001
FMA Boundary Changes and Expansion
Weyerhaeuser and Sunpine Forest Products Ltd. agreed to amend the R-2U forest management unit to support Weyerhaeuser's AAC share from the unit. The FMA area boundary was adjusted to reflect this.

The Province also completed an exercise to improve the accuracy of the existing FMA boundary from the current +/-500 metre accuracy to +/-20 metre accuracy. Minor changes occurred along the major watercourses and are adjustments to the high water mark. Other minor changes resulted from the revised estimate of where the height of land occurs.

2002-03
During this period, Weyerhaeuser received both ISO and CSA certification covering the Forest Management Area as defined in the FMA Agreement.

2004
On May 1st, 2004, Alberta created a Forest Management Unit designated as Sustained Yield Unit R12 that encompassed the following FMUs: R1Y, R2Y, R3Y, R4Y and R1. The total area of SYU R12 is approximately 520,000 hectares.

Figure 1-1 shows the historical development of the Drayton Valley FMA area.

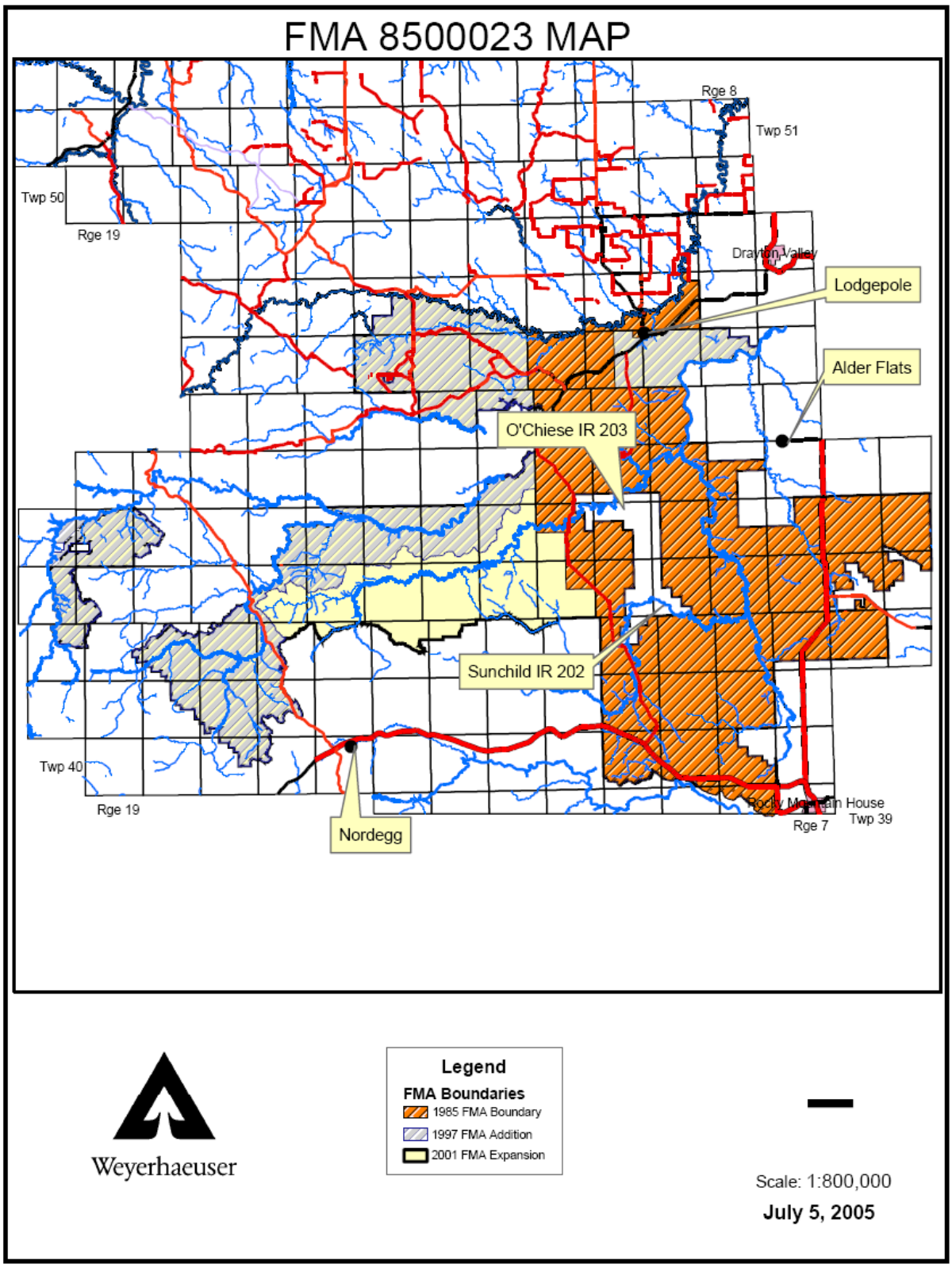

Figure 1-1 Drayton Valley FMA Area

1.2 Description of SYU R12

1.2.1 Physical Features

The area extends from agriculturally developed lands on the eastern edge to west of the Bighorn Range (Map 1-1). This unique east / west orientation provides a wide range of variation in plant and wildlife species, mesoclimate, topography, and other ecological characteristics.

1.2.1.1 Ecological Information [1]

The SYU contains five natural subregions of which the primary three (lower and upper foothills and subalpine) make up 98% of the area (Table 1-1). The three major subregions are described in more detail below.

Table 1-1 Natural Subregions in SYU R12

Natural Sub-Region	Area (Ha)	Percentage
Alpine	1,326	0.3
Dry Mixedwood*	102	0.0
Lower Foothills	400,758	76.9
Sub-Alpine	9,103	1.7
Upper Foothills	109,589	21.0
Total	520,877	100.0

*Dry mixedwood NSN occurred outside FMA and was classified as LF in FMU R1.

Lower Foothills

The Lower Foothills natural subregion is characterized by deciduous forests, deciduous-dominated mixedwood forests, and coniferous forests made up of white spruce and lodgepole pine. The Lower Foothills natural subregion represents a transition from the aspen and white spruce dominated boreal mixedwood forest to the lodgepole pine dominated forests of the Upper Foothills natural subregion. The Lower Foothills natural subregion is the predominant region, accounting for approximately 77% of the area.

[1] Beckingham, J.D., I.G.W. Corns and J.H. Archibald. 1996 Field guide to ecosites of West-Central Alberta. Can. For. Serv., Northw. Region Special Rep. 9. UBC Press, Vancouver

Map 1-1 SYU R12 Base Feature

Map 1-2 Ecosite Classification

Upper Foothills

The Upper Foothills natural subregion occurs at elevations above the Lower Foothills natural subregion. Coniferous forests containing mainly lodgepole pine dominate the natural subregion. The Upper Foothills can be distinguished from the Lower Foothills natural subregion by the general lack of aspen. The mixing of white spruce and Engelmann spruce in conifer forest stands has also been observed in the Upper Foothills. The Upper Foothills natural subregion accounts for approximately 21% of the area.

Subalpine

The Subalpine natural subregion occurs above the Upper Foothills and is dominated by stands of lodgepole pine. The presence of Engelmann spruce instead of white spruce in successionally mature stands, along with subalpine fir, is another indication of the Subalpine natural subregion. The Subalpine natural subregion makes up approximately 1.7% of the area.

Ecosite Classification

The area straddles the Lower Foothills, Upper Foothills and the Subalpine natural subregions, as determined through the ecological classification of the FMA Area (Appendix 1-1) using SiteLogix (Map 1-2). The SiteLogix boundaries do not precisely match the boundaries of the SRD natural subregions.

A predictive ecosite classification of the FMA Area was completed during the summer of 1999, and updated in the spring of 2004 to include the expanded FMA (R2 portion added) and several areas outside the FMA (in FMU R1) that were included for timber supply purposes. The knowledge base of the model was derived from information contained in the *Field guide to ecosites of west central Alberta*[2], the *Field guide to ecosites of northern Alberta*[3] and expert opinion. The model used to classify the area was SiteLogix, developed by Mr. Beckingham of Geographic Dynamics Corporation. The model assigned ecosites to the landscape by performing a "best fit" classification using various digital map sources as a basis for map assignment. Ecological field data was collected in order to tailor the SiteLogix model to reflect the local ecological conditions.

Table 1-2 provides the area of each ecosite by LMU. Each ecosite map unit is defined as representing a single ecosite or a grouping of two ecosites. Sites strongly associated with one ecosite were assigned a single ecosite map unit label. For those sites with map information strongly correlated with two ecosites, a complex ecosite map unit label was assigned. The order in which the ecosites are named in a complex map unit does not necessarily indicate that the first ecosite has a higher probability of occurrence over the second. Figure 1-2 identifies the distribution of single ecosites and some of the complex

[2] Beckingham et al. 1996
[3] Beckingham and Archibald 1996

ecosites on the edatopic grid. The edatopic grid is a moisture/nutrient continuum that displays the potential ranges of relative moisture (very dry to wet) and nutrient (very poor to very rich) conditions and outlines relationships between each of the ecosites.

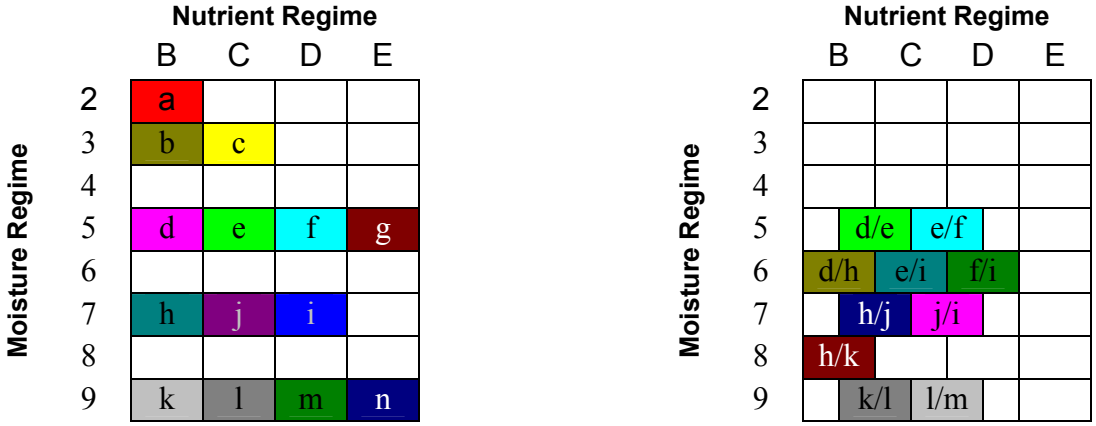

Figure 1-2 Distribution of single and complex ecosites on the edatopic grid

The largest ecosite in the SYU, low-bush cranberry (LF/UF-e) is described below:

The low-bush cranberry (LF-e) and the tall bilberry/arnica (UF-e) ecosite units represent the reference ecosites for their respective natural subregions, and account for over 43% of the SYU Area. The management implications for these ecosites include:

- Good timber productivity,
- Harvest operations possible during drier periods of summer, and
- Vegetation competition in reforestation is moderate to high.

1.2.1.2 Elevation and Topography

Elevation ranges from 760 metres in the northeast to 2620 metres in the southwest along the Bighorn Range (Map 1-3).

The topography for the western portion of the FMA Area within the Subalpine natural subregion and for some of the Upper Foothills natural subregion is characterized by a pattern of medium to high relief, steeply inclined bedrock ridges, and inter-ridge valleys. The area within the eastern portion of the Upper Foothills natural subregion and western portion of the Lower Foothills is characterized by strongly rolling ridges interspersed with lowland areas. The eastern portion of the FMA Area within the Lower Foothills natural subregion is made up of rolling topography. Of particular note in the eastern portion is the area in the vicinity of Medicine Lake, which is characterized by poorly drained, hummocky moraine deposits.

Map 1-3 Contours - 50 Meter Interval

Table 1-2 Ecosite Classification by LMU (hectares)

Ecosite	IR	R1 Outside FMA	Baptiste	Blackstone	Elk River	Marshy Bank	Medicine Lake	Nordegg River	O'Chiese	Sand Creek	Tall Pine	Willesden Green	SYU Total
unclass.	19,303	49	174	24	58	149	0	0	0	19	0	1	19,778
a		2	1	9		5		35	13	34	10	24	132
b/c				60		28		274	68				430
c			785	4,762	11	4,017		561	20		16	9	10,180
d		348	5,576	8,670	5,006	371	1,357	5,192	5,928	1,187	1,582	2,441	37,658
d/e		173	3,591	3,599	5,267	2,004	527	6,066	5,165	214	722	783	28,111
d/h		178	1,316	22	1,017		148	1,431	779	297	420	1,114	6,721
e		3,581	29,996	17,245	18,340	9,342	9,571	31,660	34,914	21,835	19,259	22,024	217,768
e/f		372	3,946		274		271	539	2,129	6,333	3,009	9,209	26,083
e/i				190	49	142		114	104				600
e/j		60	499		407		142	591	490	562	612	779	4,142
f		541	885	52	935	95	114	1,037	1,099	3,906	1,679	3,546	13,889
f/g				28									28
f/i		17	242		802		4	960	188	376	378	527	3,495
f/j				117	20	18		3	2				159
g		90	347	294	43	5	30	154	106	110	104	186	1,468
g/l					1								1
h		13	261	39	304		171	193	256	202	138	389	1,967
h/i				10		19		4	4				38
h/j		1	10		7			9	49		31	28	135
h/k		36	2,608	234	888	205	300	1,636	1,861	332	550	298	8,948
i		100	291	428	206	365	291	375	339	268	355	625	3,644
i/j				289	2	247		66	50				653
j		249	831	44	397	89	351	1,071	1,167	778	871	931	6,780
j/i		23	189		132		67	549	545	233	439	176	2,353
k/l		557	5,557	807	7,519	233	3,983	7,800	6,286	2,851	2,937	4,157	42,687
l		108	960		568		169	668	1,200	317	262	552	4,804
l/m		738	10,868	551	5,246	126	1,609	6,652	5,648	2,466	3,447	3,912	41,263
m		171	1,824	6	1,237	6	731	1,694	1,332	242	897	700	8,841
n			6		15		8		2	32			63
w		113	1,135	16	756	2	581	469	2,301	710	1,034	884	8,001
x		8	9	0		0		2	20	42	0	0	80
y		3,224	3,042	140	1,504	6	174	674	854	2,846	1,207	2,264	15,934
z		253	85	1,846	8	182		835	347	70	269	149	4,042
Total	**19,303**	**11,004**	**75,035**	**39,480**	**51,020**	**17,654**	**20,599**	**71,316**	**73,268**	**46,264**	**40,227**	**55,706**	**520,877**

1.2.1.3 Soils

The soils in lower elevations of the Lower Foothills can be described in terms of their predominant parent materials: glacial till, organic, fluvial, and eolian. Till deposits cover much of the FMA Area. In the northwest FMA Area, the parent material consists of slightly to moderately stony, loamy textured till in the uplands, interspersed with 20 - 45% organics in the lowlands. Along the Brazeau River gravelly textured outwash deposits with sandy to silty textured veneers are common.

The Medicine Lake area is characterized by well to poorly drained hummocky moraine deposits with 26 to 45% organic materials. Eolian parent materials occur in both the northern and southern portions of the FMA Area. Eolian deposits in the northern portions are discontinuous sandy veneer over fine textured till deposits. The eolian deposits in the southern portion are deep, sandy textured, and wind blown, exhibiting rapid permeability. Fluvial deposits occurring along the North Saskatchewan River and associated streams are often associated with floodplains and alluvial flats, and are enclosed by steeply sloping valley walls.

The predominant parent materials in the Subalpine natural subregion are heterogeneous mixtures of colluvium, till, residuum, and glaciofluvial and fluvial deposits found along major creeks and valley bottoms. Organic sites are dispersed throughout the FMA Area and are generally associated with bogs and poor fens.

1.2.2 Landscape Management Unit Development

The SYU Area was divided into eleven[4] areas (see Map 1-1) that Weyerhaeuser has termed Landscape Management Units (LMUs). The specific purposes of developing LMUs were:

- to set LMU specific objectives, where appropriate, and
- to stratify the landscape due to varying physical, social, or economic characteristics.

The division of the SYU into Landscape Management Units involved the following steps:

1. production of thematic maps,
2. analysis of thematic maps and data-sets to determine differentiation of units based on physical, social, or economic characteristics,
3. production of draft Landscape Management Unit boundaries,
4. determination of initial concerns and/or objectives for each LMU,
5. review of draft LMUs and the concerns/objectives with Weyerhaeuser Forest Advisory Committee,
6. review of draft LMU boundaries by ASRD, and
7. provision for LMU boundary information at open houses for public review.

[4] The original Gross FMA was divided into 10 LMUs. With the agreement by Weyerhaeuser in early 2004 to include 2 small portions of old FMU R1 into the SYU, an additional area (currently not named) was created for data tracking purposes.

1.2.3 Landscape Patterns and Structure

1.2.3.1 Age Class and Seral Stage Distribution

For the DFMP, the age class of the AVI stands is defined by the stand age. The age class distribution for all of the forested stand types is presented in Table 1-3 and Table 1-4 (also by landscape management unit) and Figure 1-3, Figure 1-4, Figure 1-5 and Figure 1-6 (includes broad cover group separation).

A spatial representation of the age class distribution of the forest is provided on the Age Class Distribution Map (Map 1-4). The Age Class Distribution Map also shows the increasing presence of older age classes in the western portion of the SYU, in the Upper Foothills and Subalpine natural subregions. The age class distribution is, in part, a result of the fire suppression policy and programs within the province.

The age classes of the various seral stages are a reference to the ecological stand conditions and not timber merchantability characteristics. All forested stand types have been classified into five ecological seral stages:

Conifer & Conifer/Deciduous Broad Cover Group Seral Stages:

Early seral stage – defined as stands between establishment and 10 years old, representing the period from disturbance to initial crown closure.

Immature seral stage – stands between 11 and 40 years old.

Mature seral stage – defined as stands between 41 and 90 years old.

Late seral stage – defined as stands between 91 and 120 years old.

Very Late seral stage – defined as stands between 121 and 170 years old.

Overmature seral stage – defined as stands greater than 170 years old.

Deciduous and Deciduous/Conifer Broad Cover Group Seral Stages:

Early seral stage – defined as stands between establishment and 10 years old, representing the period from disturbance to initial crown closure.

Immature seral stage – stands between 11 and 40 years old.

Mature seral stage – defined as stands between 41 and 70 years old.

Late seral stage – defined as stands between 71 and 110 years old.

Very Late seral stage – defined as stands between 111 and 170 years old.

Overmature seral stage – defined as stands greater than 170 years old.

Table 1-3 Age Class Distribution of C & CD Broad Cover Groups be Landscape Management Unit and Summary by Seral Stage(in hectares)

Age Classes	R1 Outside FMA	Baptiste	Blackstone	Elk River	Marshy Bank	Medicine Lake	Nordegg River	O'Chiese	Sand Creek	Tall Pine	Willesden Green	SYU Total
0-9		2,130	0	1,349	34	39	4,921	5,152	551	1,433	433	16,043
10-19		922	265	996	284		632	1,308	344	2,957	186	7,893
20-29	0	200	96	79	225	1	820	134	161	242	113	2,071
30-39	97	991	9	335	114	235	338	395	97	163	503	3,277
41-49	566	1,779	255	202	22	152	162	1,840	323	633	5,427	11,361
50-59	815	2,974	781	612	128	4,833	334	1,626	1,298	792	3,283	17,475
60-69	49	8,944	1,096	4,071	514	174	1,476	2,391	1,513	1,584	1,901	23,712
70-79	408	2,623	3,364	519	463	267	4,391	4,609	1,332	1,351	352	19,678
80-90	196	1,974	93	111	559	99	6,441	8,435	3,116	1,828	2,559	25,412
91-99	59	8,182	292	13,719	101	1,492	8,313	5,668	2,860	1,689	1,232	43,608
100-109	521	9,910	16,104	8,234	6,511	853	19,541	10,189	2,175	3,162	2,376	79,574
110-120	308	2,274	968	2,267	317	2,147	5,131	2,245	1,227	3,325	572	20,783
121-129	229	3,911	1,093	1,470	237		2,111	5,803	1,171	2,702	1,078	19,804
130-139	32	287	5,574	3,584	1,383		5,433	1,388	212	647	154	18,694
140-149	3	789		235	225	290	588	2,711	116	293	238	5,490
150-159		26	3,241	780	720	11	608	549		11	114	6,059
160-170	0		48	213	20		68	145			5	499
171-179	18		183	151	854	80	11	227			264	1,787
180-189		5					19	14		2		40
190-199			800	54	21		2					877
200-209			538					22				561
210-219												0
220-229			12									12
230-239			1,763		2,214							3,976
240-249												0
>250					2,179		2					2,181
Total	**3,300**	**47,923**	**36,574**	**38,980**	**17,126**	**10,672**	**61,340**	**54,850**	**16,495**	**22,815**	**20,791**	**330,867**

Early	Immature	Mature	Late	Very Late	Overmature	Total
16,043.4	13,240.5	97,638.3	143,964.8	50,545.1	9,434.9	330,867.1
4.8%	4.0%	29.5%	43.5%	15.3%	2.9%	100.0%

Table 1-4 Age Class Distribution of D & DC Broad Cover Groups by Landscape Management Unit and Summary by Seral Stage (in hectares)

Age Classes	R1 Outside FMA	Baptiste	Blackstone	Elk River	Marshy Bank	Medicine Lake	Nordegg River	O'Chiese	Sand Creek	Tall Pine	Willesden Green	SYU Total
0-9		1,684		1,013		31	205	2,836	3,347	903	2,355	12,374
10-19	2	117		1,368			2	360	1,290	1,145	1,058	5,342
20-29	23	194		66		43	88	180	847	596	572	2,610
30-39	177	460		70		1,072	168	237	906	454	2,197	5,741
41-49	415	768	4	59		507	124	154	1,051	1,448	7,702	12,230
50-59	648	2,234		25		4,371	171	187	1,818	1,685	2,937	14,076
60-69	132	634		89		171	67	147	1,437	395	2,817	5,888
70-79	1,171	2,070	8	273		431	187	294	1,198	1,881	414	7,927
80-90	231	1,307		177			730	1,017	8,259	1,769	1,933	15,425
91-99	29	3,042	5	1,540		26	490	4,847	1,950	1,388	892	14,210
100-109	296	4,353		2,155	33	1,209	3,016	1,466	2,083	882	4,732	20,225
110-120	325	532		1,464			1,086	490	51	73		4,020
121-129	51	771				1	149	167	27	74	471	1,711
130-139							260	4				264
140-149				3				265				268
150-159				7			19					26
160-170												0
171-179												0
180-189												0
190-199												0
200-209												0
210-219												0
220-229												0
230-239												0
240-249												0
>250												0
Total	**3,498**	**18,165**	**17**	**8,310**	**33**	**7,864**	**6,763**	**12,650**	**24,263**	**12,695**	**28,079**	**122,338**

Early	Immature	Mature	Late	Very Late	Overmature	Total
12,374.4	13,692.5	32,194.7	57,787.4	6,289.0	0.0	122,338.0
10.1%	11.2%	26.3%	47.2%	5.1%	0.0%	100.0%

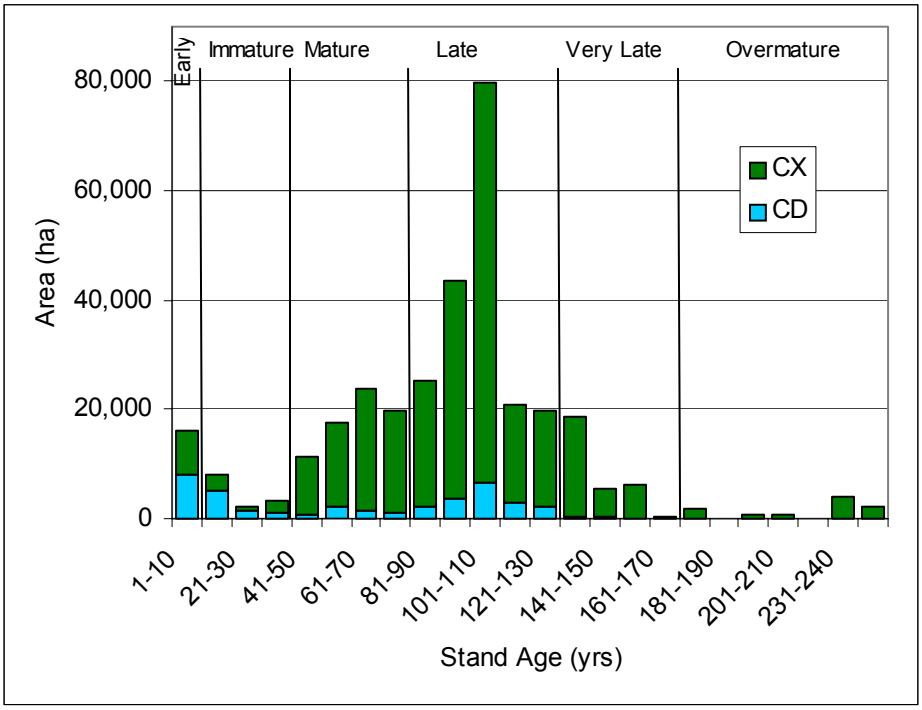

Figure 1-3 AVI Age Class Distribution for Primarily Coniferous (C & CD) Broad Cover Groups in hectares for Gross Forested Landbase

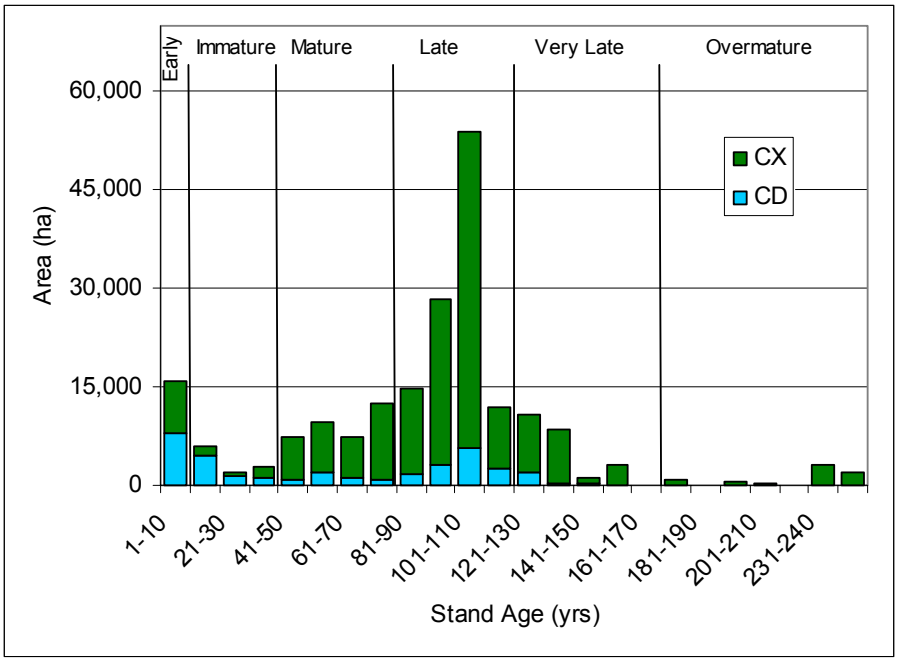

Figure 1-4 AVI Age Class Distribution for Primarily Coniferous (C & CD) Broad Cover Groups in Hectares for Productive Landbase

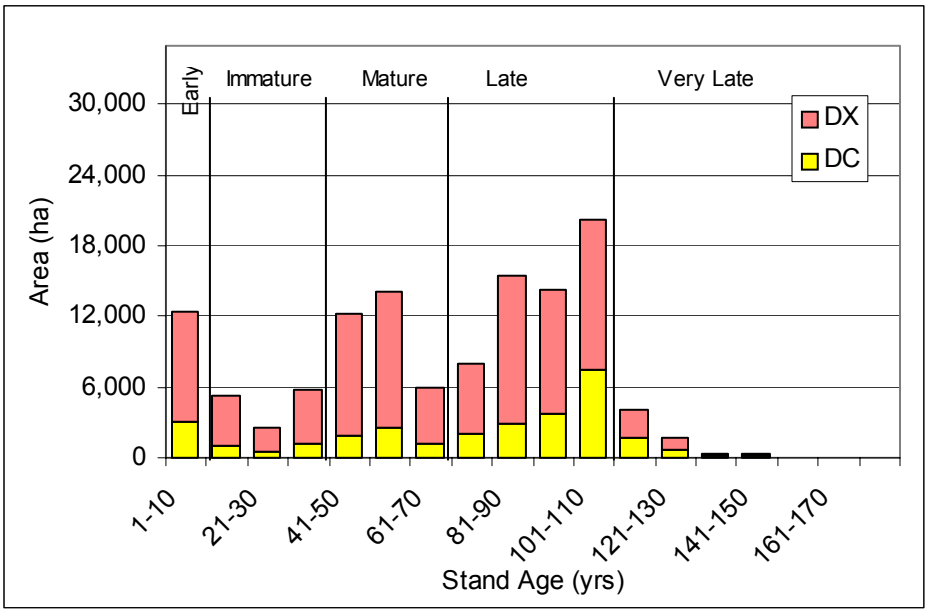

Figure 1-5 AVI Age class Distribution for Primarily Deciduous (D & DC) Broad Cover Groups in Hectares (Gross Forested Landbase)

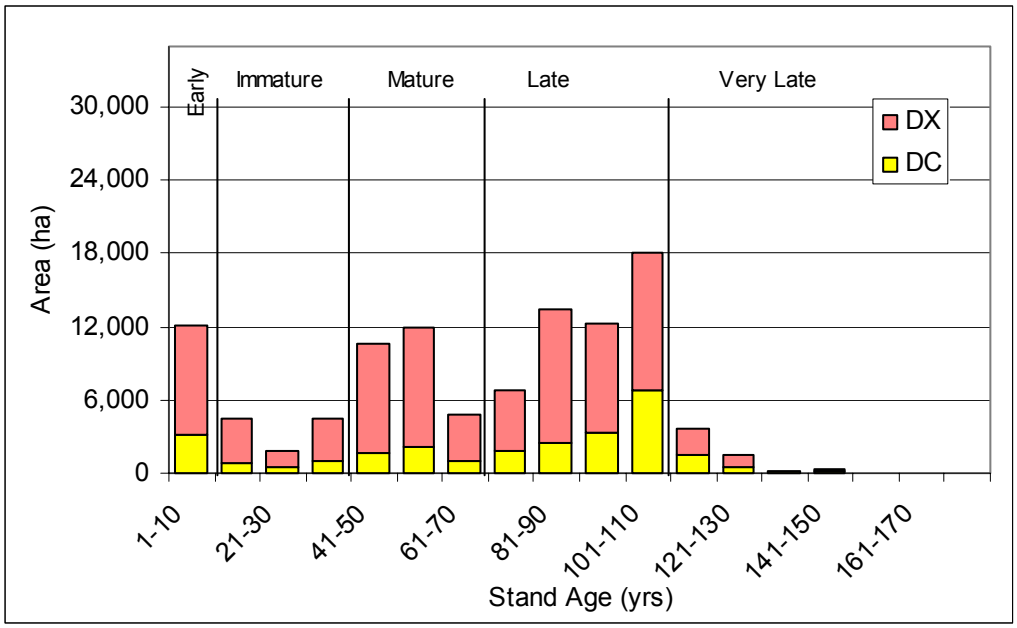

Figure 1-6 AVI Age Class Distribution for Primarily Deciduous (D & DC) Broad Cover Groups in Hectares (Productive Landbase)

As Table 1-3 and Table 1-4 demonstrate, almost 47% of the forests are in the late seral stage, (13%) are in the very late seral stage and a small portion (2%) are in the overmature seral stage. This high proportion of forest stands older than the average conifer rotation age raises longevity concerns for the long-term management of commercial timber values. As large amounts of the forest reach the late seral stage the susceptibility to and risk of a catastrophic event caused by fire, insects or disease increases.

Table 1-5 shows the relative proportions of broad cover groups by origin class and seral stage. The very late seral stage is made up almost exclusively of coniferous-dominated stands (greater than 99%).

Table 1-5 Relative Age class Distribution by Broad Cover Group and Summary of Seral Stage in Percent

Age_Class	CX	CD	DC	DX	Age_Class
0-9	28.20%	28.26%	11.04%	32.50%	0-9
10-19	21.79%	37.84%	7.34%	33.02%	10-19
20-29	10.88%	33.36%	11.55%	44.21%	20-29
30-39	23.67%	12.67%	12.99%	50.67%	30-39
41-49	44.32%	3.83%	7.97%	43.87%	41-49
50-59	48.25%	7.14%	8.05%	36.57%	50-59
60-69	75.66%	4.45%	4.03%	15.86%	60-69
70-79	67.36%	3.92%	7.62%	21.10%	70-79
80-90	57.29%	4.94%	7.02%	30.75%	80-90
91-99	69.06%	6.36%	6.49%	18.09%	91-99
100-109	73.27%	6.47%	7.45%	12.81%	100-109
110-120	72.70%	11.09%	6.60%	9.61%	110-120
121-129	81.44%	10.60%	2.86%	5.09%	121-129
130-139	96.02%	2.59%	0.85%	0.55%	130-139
140-149	90.62%	4.72%	1.98%	2.68%	140-149
150-159	98.54%	1.04%	0.11%	0.31%	150-159
160-170	100.00%	0.00%	0.00%	0.00%	160-170
171-179	99.81%	0.19%	0.00%	0.00%	171-179
180-189	100.00%	0.00%	0.00%	0.00%	180-189
190-199	99.56%	0.44%	0.00%	0.00%	190-199
200-209	98.40%	1.60%	0.00%	0.00%	200-209
220-229	0.00%	0.00%	0.00%	0.00%	220-229
230-239	100.00%	0.00%	0.00%	0.00%	230-239
240-249	0.00%	0.00%	0.00%	0.00%	240-249
>250	100.00%	0.00%	0.00%	0.00%	>250

BCGP	Early	Immature	Mature	Late	Very Late	Overmature
CX	28.20%	20.52%	69.37%	64.97%	83.47%	99.83%
CD	28.26%	28.64%	5.83%	6.38%	5.47%	0.17%
DC	11.04%	9.96%	4.32%	8.01%	4.46%	0.00%
DX	32.50%	40.88%	20.47%	20.63%	6.61%	0.00%

Map 1-4 Age Class Distribution

1.2.3.2 Forest Types – Broad Cover Group and Leading Species

The broad cover group information and for each landscape management unit is presented in the following tables (See Table 1-6, Table 1-7 and Table 1-8) and spatially on the Broad Cover Group Map (Map 1-5). Broad cover group is defined by the occurrence of conifer in a given AVI stand:

- Conifer - stands with at least 80% conifer,
- Conifer/Deciduous - stands where the conifer component is at least 50% and less than 80%, and the leading species is conifer,
- Deciduous/Conifer - stands where the conifer component is at least 30% and no more than 50%, and the leading species is deciduous, and
- Deciduous - stands with less than 30% conifer.

Coniferous species increasingly predominate from east to west. Both the Blackstone and Marshybank LMUs are made up almost exclusively of coniferous-dominated stands. This large proportion of coniferous stands is one of the factors contributing to the high aesthetic values of these LMUs.

Based on species and percentage information from the Alberta Vegetated Inventory, the following tables (Table 1-9 and Table 1-10) represent an area-weighted summary of tree species on the FMA Area and Landscape Management Units. A map representing the predominant tree species (leading in AVI) is provided on Map 1-6 Leading Species Map.

Table 1-6 Broad Cover Group for the SYU Area as Percent

Broad Cover Group	Gross Landbase % of SYU forested area	Productive Landbase % of SYU forested area
Deciduous – DX	20.35%	25.79%
Deciduous / Coniferous – DC	6.65%	8.69%
Coniferous / Deciduous – CD	8.68%	11.53%
Coniferous - CX	64.33%	53.99%

Table 1-7 Broad Cover Group by Landscape Management Unit as a Percent for the Gross SYU Area

LMU	Coniferous	Conifer/Decid	Decid/Conifer	Deciduous
R1	40.85%	7.70%	12.88%	38.58%
Baptiste	64.15%	8.36%	8.52%	18.96%
Blackstone	99.75%	0.21%	0.04%	0.01%
Elk River	72.76%	9.66%	7.56%	10.02%
Marshy Bank	99.81%	0.00%	0.00%	0.19%
Medicine Lake	50.94%	6.63%	9.39%	33.04%
Nordegg River	81.28%	8.79%	4.38%	5.55%
O'Chiese	69.99%	11.27%	4.89%	13.86%
Sand Creek	30.08%	10.39%	8.77%	50.76%
Tall Pine	48.46%	15.79%	11.62%	24.13%
Willesden Green	34.44%	8.11%	8.82%	48.64%

Table 1-8 Broad Cover Group by Landscape Management Unit as a Percent for the Productive SYU Area

LMU	Coniferous	Conifer/Decid	Decid/Conifer	Deciduous
R1	27.63%	9.40%	15.72%	47.24%
Baptiste	50.96%	11.83%	12.11%	25.10%
Blackstone	99.95%	0.01%	0.04%	0.01%
Elk River	60.09%	14.27%	11.01%	14.63%
Marshy Bank	99.77%	0.00%	0.00%	0.23%
Medicine Lake	29.00%	9.84%	14.12%	47.03%
Nordegg River	74.69%	12.44%	5.94%	6.93%
O'Chiese	61.75%	14.87%	6.11%	17.27%
Sand Creek	19.14%	12.37%	10.19%	58.29%
Tall Pine	34.26%	20.85%	15.35%	29.54%
Willesden Green	22.12%	9.38%	10.47%	58.03%

Map 1-5 Broad Cover Group

Map 1-6 Leading Species

Table 1-9 Tree Species on the SYU as a Percent

Tree Species	% of SYU forested area
Aspen	26.4%
Balsam Poplar	0.8%
Birch	0.3%
Balsam Fir	0.0%
Black Spruce	17.1%
Lodgepole Pine	33.7%
Tamarack	6.3%
White Spruce	15.4%

Table 1-10 Tree Species by Landscape Management Unit as a Percent on the SYU

LMU	AW	PB	BW	FB	SB	PL	LT	SW*
R1	50.5%	1.0%	0.2%	0.0%	13.4%	19.1%	5.7%	10.1%
Baptiste	28.2%	0.1%	0.0%	0.0%	18.9%	35.1%	11.4%	6.3%
Blackstone	0.0%	0.0%	0.0%	0.1%	7.2%	61.6%	0.0%	31.1%
Elk River	17.2%	0.8%	0.0%	0.0%	22.9%	41.2%	9.8%	8.2%
Marshy Bank	0.2%	0.0%	0.0%	0.0%	5.1%	56.1%	0.0%	38.6%
Medicine Lake	42.1%	0.1%	0.3%	0.0%	27.6%	16.3%	5.4%	8.3%
Nordegg River	11.3%	0.5%	0.0%	0.0%	19.9%	45.9%	8.5%	13.9%
O'Chiese	19.2%	0.3%	0.1%	0.1%	18.5%	35.1%	6.7%	20.0%
Sand Creek	53.9%	3.1%	1.5%	0.0%	13.0%	9.8%	2.7%	16.0%
Tall Pine	36.9%	1.0%	0.4%	0.0%	18.5%	17.5%	5.5%	20.2%
Willesden Green	84.2%	2.4%	1.8%	0.0%	0.1%	5.7%	5.1%	0.6%

*The White Spruce numbers include the incidental presence of Engelmann Spruce in the Upper Foothills natural subregion.

The most common tree is lodgepole pine, with a large component of pine being found in the Baptiste, Blackstone, Elk River, Marshybank, and Nordegg River LMU's. Lodgepole pine is a relatively short-lived tree (seldom over 200 years old) and thrives in areas that are periodically burned by forest fires[5]. The predominance of lodgepole pine and the age class origin presented in Table 1-2, Table 1-3 and Table 1-4 is a point of concern to Weyerhaeuser for the long-term management of the conifer forests over the landscape.

[5] Kershaw, L., MacKinnon, A. and Pojar, J. 1998. Plants of the Rocky Mountains. Lone Pine Publishing.

1.2.3.3 Landscape Characteristics

Forested ecosystems are complex and dynamic mosaics of vegetation patches that vary in size, composition, age structure and distribution. Their dynamic heterogeneity is driven by natural processes (e.g. succession), by stand-replacing events (e.g. fire, insect outbreaks, or disease epidemics), and by disturbances that occur at smaller scales (e.g. mortality of individual trees).

The range of forest age classes, the size and shape of patches[6] in each age class, and the variety in overstorey, understorey structure and floristic composition provide habitat for all wildlife species in a specific region.

In order to develop harvest designs that maintain heterogeneous forest ecosystems (away from cut/leave patterns), current and historic landscape diversity needs to be described and quantified through the use of spatial statistics. To that objective, Weyerhaeuser retained GISmo Solutions Limited to provide detailed Landscape Analysis of all Landscape Management Units.

Landscape Analysis of the FMA (without the R2Y expansion area) was done through the Patch Analyst 2.0 program developed by researchers at Lakehead University as part of the Sustainable Forest Management Network research program at the University of Alberta. Patch Analyst is an extension to the ArcView® GIS application that facilitates the spatial analysis of landscape patches and the modeling of attributes associated with patches. Patch Analyst (Grid) includes a user interface to FRAGSTATS[7], as well as separate based spatial analysis functions.

Numerous patch metrics were calculated, including mean and median patch size, patch size coefficient of variance and standard variation, edge density, mean shape index, fractal dimension, interspersion and juxtaposition, Shannon's diversity index, and core area index. These landscape diversity indices measured the current (1999) spatial heterogeneity of each Landscape Management Unit. However, as described in 1.2.8, the Drayton Valley FMA Area is dissected by many linear corridors (powerlines, pipelines, roads, etc.) that, over time, have altered the

[6] *Patch* can be defined as “a relatively heterogeneous non-linear area that differs from its surroundings” (Forman 1996. Land Mosaics. Cambridge University Press 642 pp.).

[7] Fragstats is a statistical package that quantifies landscape structure through numerous metrics including: area, patch density, size and variability metrics; edge, shape, core area, and diversity metrics, and contagion and interspersion metrics (McGarigal, Kevin; Marks, Barbara J. 1995. FRAGSTATS: spatial pattern analysis program for quantifying landscape structure. Gen. Tech. Rep. PNW-GTR-351. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 122 pp.)

number, distribution, sizes and shapes of forest stands. The amount of linear disturbance currently on the landscape does not naturally occur in forest landscapes. The current landscape diversity may not reflect a naturally functioning forest ecosystem and may not provide enough habitat diversity to meet the needs of all wildlife species.

To better understand the natural diversity of each Landscape Management Unit, spatial analysis and modeling were used to remove all linear corridors from each landscape and recreate the forest mosaic that most likely existed prior to 1960. The year 1960 was selected based on the earliest year of land disposition within the land use data set. An example for the Sand Creek LMU is provided in Figure 1-7 and Figure 1-8. Landscape analysis was then conducted on the recreated forest mosaic and compared with the current conditions.

Landscape analysis shows that the current landscape diversity has been significantly altered by linear disturbances. Figure 1-9 shows the degree of patch fragmentation that results from roads, pipelines and powerlines. In LMUs such as Marshybank and Medicine Lake, the percent increase in the number of patches is relatively small (28 and 52%, respectively); in other LMUs such as Sand Creek the percent increase reaches 668% (Figure 1-9 and Figure 1-10).

The high degree of landscape fragmentation is reflected in many other Landscape Indices (GISmo) such as the average patch size (Figure 1-10 and Figure 1-11).

As shown in, the current average patch size ranges between 7 and 60 hectares. In 7 LMUs the average patch size does not reach 20 hectares. This contrasts with average patch sizes prior to 1960 (Figure 1-11). More importantly, the range of patch sizes in each individual LMU, as represented by the standard deviations, is considerably less in current landscapes from what the range used to be prior to the 1960s. These results indicate less variability in patch size in current landscapes and, hence, decreased habitat opportunities for interior-dependent wildlife species.

The historic average patch size shows also interesting differences among LMUs. For instance, while Baptiste, O'Chiese South, Elk River and Sand Creek have similar average patch size (40-45 ha), their standard deviations are significantly different. The landscape analysis results suggest that in the Elk River LMU there would naturally be larger patches (SD = 848 ha) than, for instance, in the Sand Creek LMU (SD = 496 ha).

The shift from large patches to small ones and the loss of large unfragmented expanses of forests is shown in Figure 1-12 with the Sand Creek LMU. The current landscape composition shows that 90% of the total 8017 patches are less than 10 ha in size and that no patches are larger than 500 ha. The loss in landscape diversity resulting from linear disturbances is further shown in Figure 1-13. There is very little difference in average patch size between seral stages, quite in contrast from historical conditions.

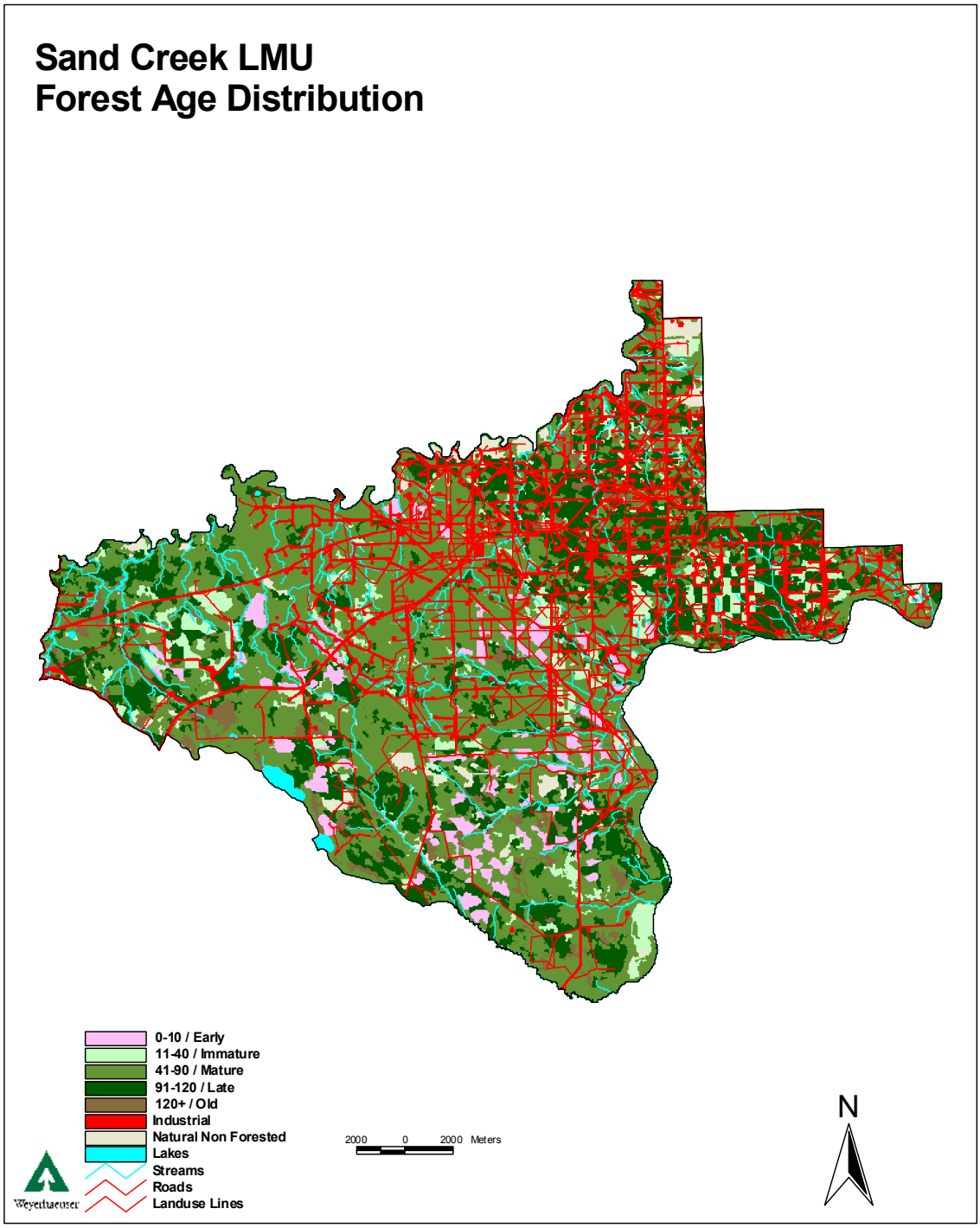

Figure 1-7 Example Forest Age Distribution for Sand Creek LMU

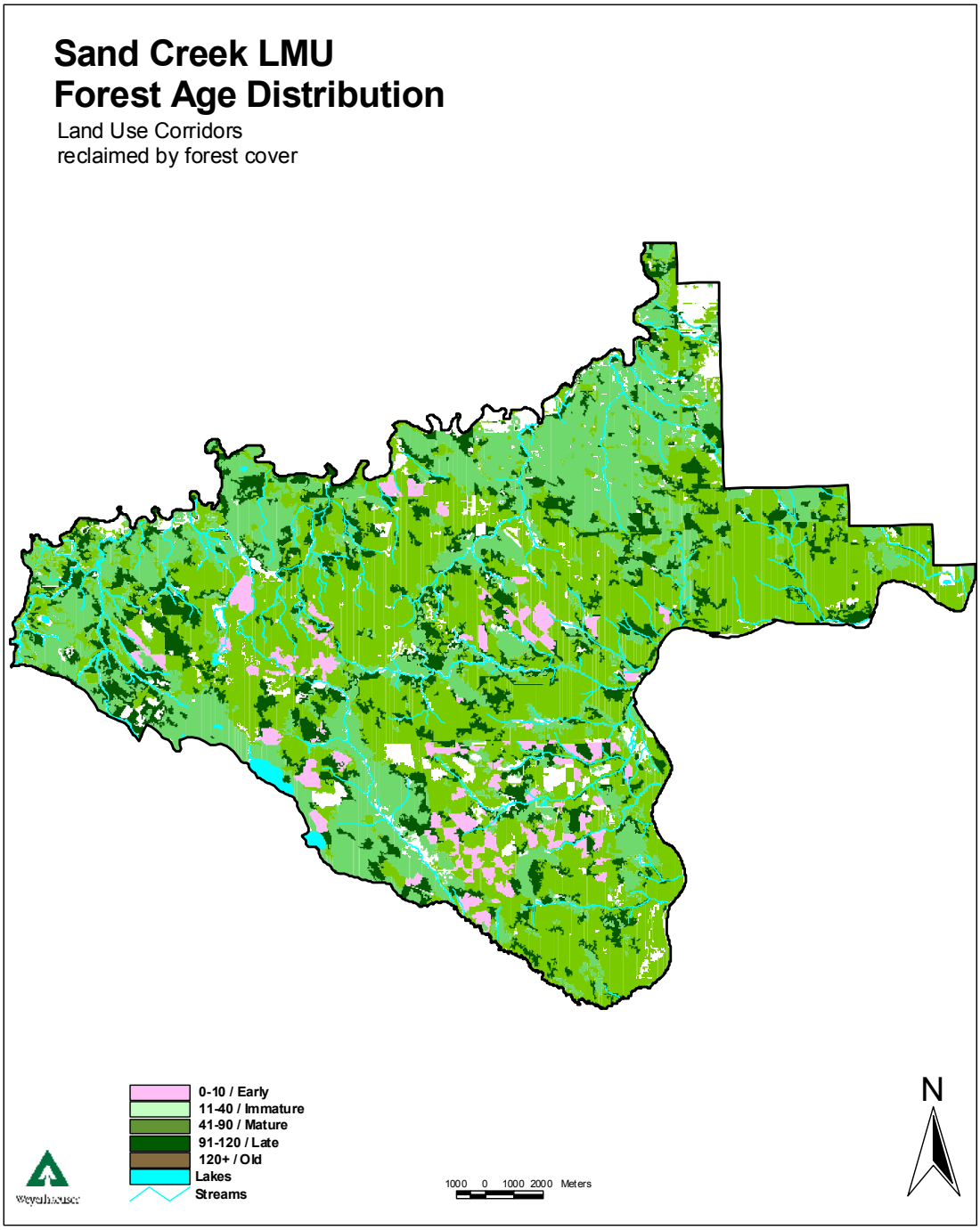

Figure 1-8 Example Reclaimed Forest Cover for Sand Creek LMU

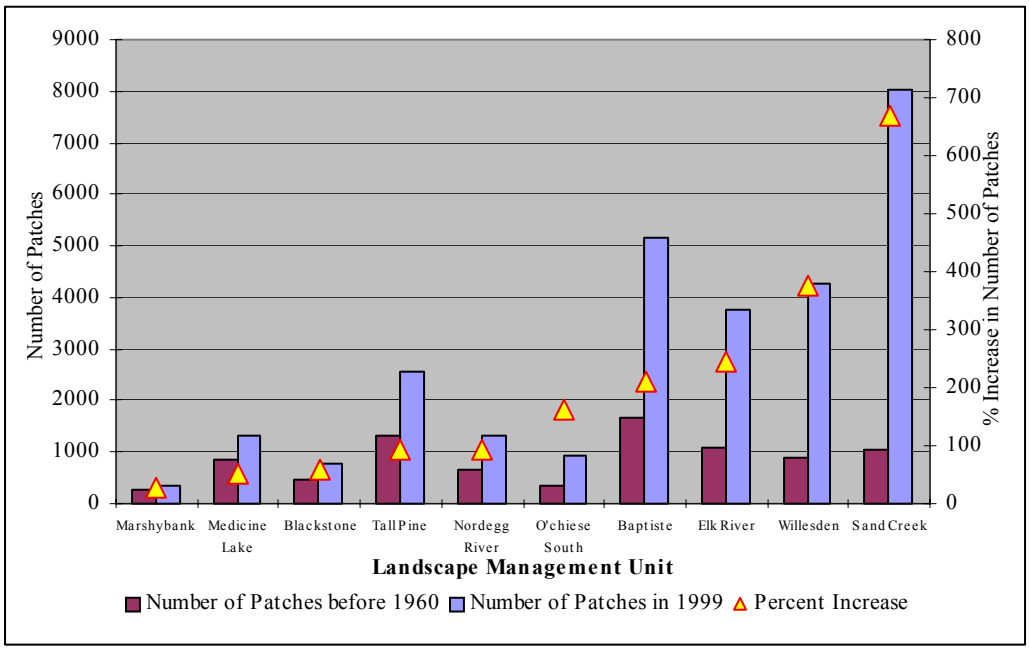

Figure 1-9 Changes in Number of Patches Within Landscape Management Units Caused by Linear Disturbances (pipelines, powerlines, roads, etc.)

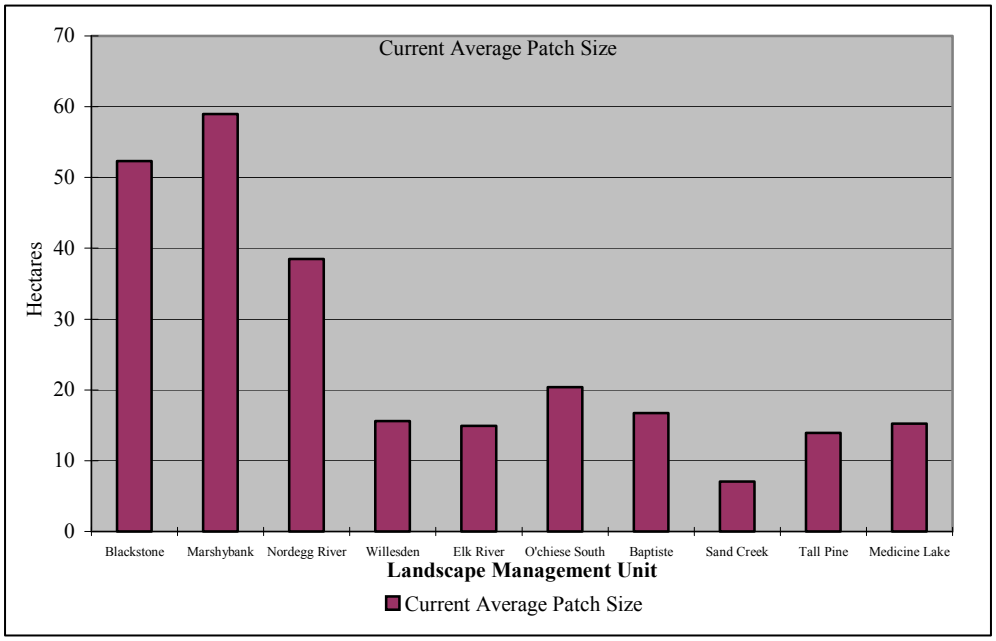

Figure 1-10 Current Average Patch Sizes

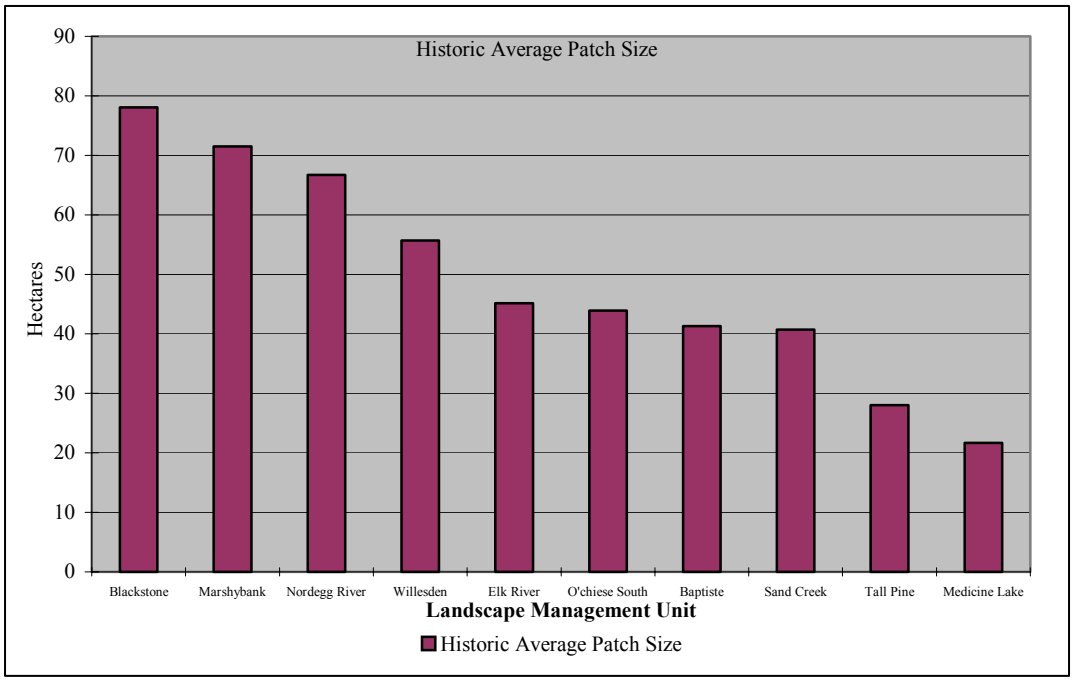

Figure 1-11 Historic Average Patch Size in Hectares

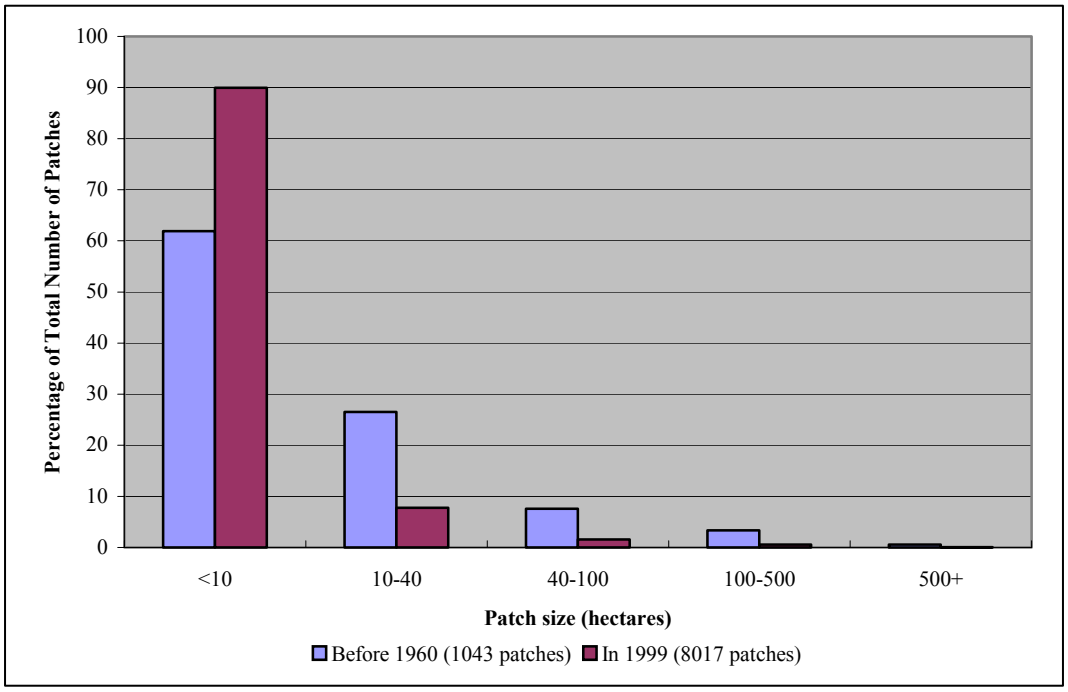

Figure 1-12 Changes in Patch Size Associated with Linear Disturbances in the Sand Creek LMU

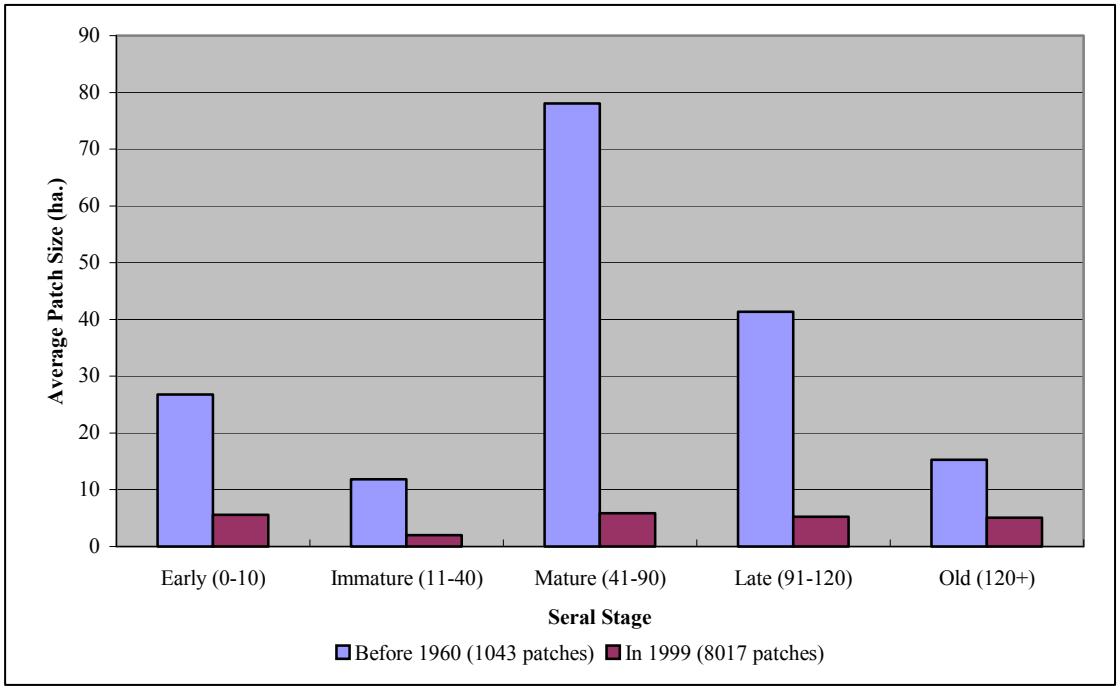

Figure 1-13 Average Patch Size of Seral Stages Current and Before 1960 in the Sand Creek LMU

1.2.4 Natural Disturbance

1.2.4.1 Natural Disturbance Patterns

1.2.4.1.1 Natural Range of Age Class Distribution

In northern forests, fire plays an important function in determining the variety of vegetation patterns observed on the landscape. The type, duration, severity and size of fire determine post-fire vegetation composition and succession (Johnson 1992)[8]. However, fires and fire regimes differ greatly across and within geographical regions, and are influenced by a number of factors including climate, weather, vegetation composition, stand age, topography and others (Rogeau 1996)[9].

The distribution of age classes across a landscape, and hence the amount of late seral stages, will vary depending on the length of time since the last fire disturbance and the fire cycle of the region[10].

[8] Johnson, E. A. 1992. Fire and vegetation dynamics: studies for the North American boreal forest. Cambridge University Press 129 p.
[9] Rogeau, M. P. 1996. Understanding age-class distribution in the Southern Canadian Rockies. M.Sc. Thesis. University of Alberta, Edmonton. 139 p.
[10] Fire cycle is defined as "the number of years required to burn over an area equal to the entire area of interest" (Merrill and Alexander 1987, Johnson and Gutsell 1994.)
Merrill, D.F. and M.E. Alexander. 1987 Glossary of Forest Fire Management Terms. 4th Edition. National Research Council of Canada. Ottawa, Canada.
Johnson, E. A. and Gutsell, S.L.. 1994. Fire frequency models, methods and interpretation. Advances in Ecological Research. 25: 239-283.

Based on the fire regime of a region, the relative contribution of stands of different ages on a landscape is believed to follow a theoretical negative exponential curve where the age-class distribution is represented by a high percentage of young age classes, an exponentially declining percentage of older age classes and a relatively small percentages of very old stands (Johnson and Gutsell 1994).

However, while on a theoretical level the age-class distribution may approach a negative exponential distribution reflecting a long-term average, at any one time the relative amount of various age classes may vary significantly. As suggested by Andison (1997[11] , 1998[12]) in his research along the foothills of Alberta, the historical range of variation in age-class distribution is wide and there is not a "natural" age-class distribution representative of a landscape. In his simulations, Andison showed, for instance, that in the Upper Foothills Natural Subregion the percentage of young (0-40 year old) stands may represent with equal probability 0 to 70% of a landscape, while older forest stands (140-200 year old) could represent anywhere from 0 to 15%. Despite the wide range of probability of representation by individual age classes, older forest classes had a smaller range of representation in any simulated age-class distribution than younger stands, indicating the lower likelihood of older stands occurring on fire-driven landscapes.

In Alberta, fire regimes differ among natural subregions depending on climate, tree species dominance, and even historical lightning strikes (Andison 2000). Natural subregions with cooler, wetter climates and less lightning activity have longer fire cycles. This has been documented by Andison in his work on natural disturbance along the foothills of Alberta and is well described by the following table.

Table 1-11 Overview of Characteristics of the Lower and Upper Foothills in the Foothills Model Forest and the Subalpine of Jasper National Park (Andison 2000[13])

	Lower Foothills	Upper Foothills	Subalpine
Fire Cycle (years)	65-75	80-90	130-190
% Area in Patches >2,000 ha	33	76	66
Lightning hits/1,000 ha	58	48	11
Growing degree days	1121	880	903
mm Rain / yr.	403	370	328
cm Snow / yr.	144	233	162

The differences in lightning strikes, growing-degree days and amount of rain and snow among the natural subregions are rough indications of the increased risk of ignition, fire growth, length of fire season and forest flammability.[14] In this context, the Lower Foothills would appear to have a high ignition probability, since this subregion has the most lightning strikes and the highest number of growing degree days. This suggests that the

[11] Andison, D. W. 1997. Landscape fire behaviour patterns in the Foothills Model Forest. Foothills Model Forest Report. Hinton, Alberta. 63 pp.
[12] Andison, D. W. 1998. Temporal patterns of age-class distributions on foothills landscapes in Alberta. Ecography 21: 543-550.
[13] Andison, D. 2000. FMF Natural Disturbance Program Research. Quicknote No. 2 – May 2000 Natural Sub-regions: Are They Meaningful? Unpublished note 2 p.
[14] Beckingham, J.D., Corns, I.G.W., and Archibald, J. H. 1996 Field guide to ecosites of West-Central Alberta. Can. For. Serv., Northw. Region Special Rep 9. UBC Press, Vancouver.

Lower Foothills subregion burns fairly often, but in relatively small patches. This can be explained by the much greater lightning activity, which is known to produce more fire starts; however, higher levels of precipitation reduce the chances of any single fire becoming very large. The size of fires is also influenced by the nature of the vegetation dominant in the Lower Foothills. Deciduous forests, which are common here, tend to limit the spread of fires due to their high moisture content in the summer. [15] In the Upper Foothills and Subalpine natural subregions, fire activity tends to be more intense due to a combination of historical ignition probabilities, topography, vegetation and fire weather indicators.

1.2.4.1.2 Current Forest Conditions

The current age-class distribution (see Figure 1-14) is the result of an effective fire suppression program over the last 50 years. It is not an ecologically-sustainable age class distribution as it does not reflect the natural processes controlling plant association development in this region. The amount of forest stands greater than 100 year old in the Lower and Upper Foothills and in the Subalpine seems to be well beyond the natural range of variation that is expected to occur in these fire-driven ecosystems.[16]

The current age of stands varies from 0 to 280 years. As shown in Figure 1-14, a large amount of the forest (the peaks in the graph) appears to have been established in the years between 1880 and 1930. The current age distribution reflects the history of active fire suppression, as well as more current harvest activity.

Fire is an important environmental factor in the ecology of the area. There are three distinct natural subregions -- the Lower Foothills, the Upper Foothills and the Subalpine -- that differ due to climate, topography, soil and parent material. The environmental conditions and the resulting natural fire regime are also reflected in different forest landscapes.

The forests in the Lower Foothills natural subregion are a mosaic of aspen and poplar stands interspersed with white spruce and lodgepole pine. Further to the west, in the Upper Foothills and Subalpine natural subregions, forests are dominated by extensive stands of conifers -- lodgepole pine, Engelmann/white spruce or, at higher elevation or in wetter areas, fir. In the Lower and Upper Foothills subregions, large expanse of black spruce and tamarack forests are common in less drained areas.

[15] Fechner, G. H. and Barrows, J. S.. 1976. Aspen stands as wildfire fuel breaks. Eisenhoover Consortium Ball. 4.
[16] Andison, D. W. 1998. Temporal patterns of age-class distributions of foothills landscapes in Alberta. Ecography 21: 543-550

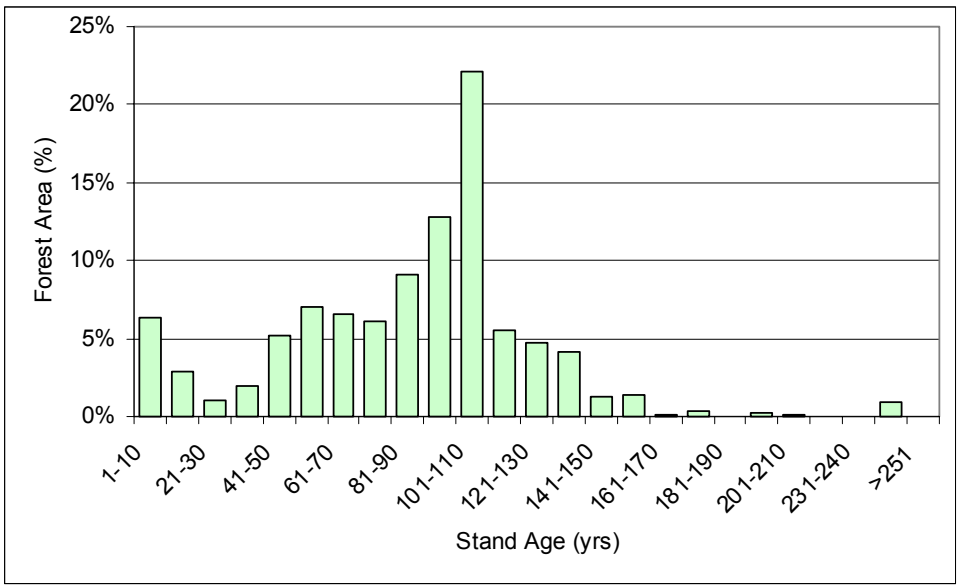

Figure 1-14 Current Relative Forest Age Class Distribution

As previously described, due to the difference in topography and climatic conditions, the three natural subregions have historically experienced distinct disturbance regimes.[17]. In the Lower Foothills, forests burned frequently (fire cycle approximately 50-75 years), but fires were rarely very large. In this region, forest stands rarely survived much beyond 120 years. Further to the west in the Upper Foothills, the forest burned less frequently (fire cycles approximately 60-90 years). In general, fires were more catastrophic, covering large areas that included stands of varying age. Closer to the mountains, in the Subalpine, fires were not common but were very catastrophic, extending over large areas.[18] In the Subalpine, forests older than 200 years are common[19] and consist of stands that survived the latest fire.

The different disturbance regimes among the natural subregions are evident in their specific age class distribution (see Figure 1-15).

[17] Andison, D. W. 1997. Landscape fire behaviour patterns in the Foothills Model Forest. Foothills Model Forest Report. Hinton, Alberta. 63 pp.
[18] White, C.A. 1985. Wildland fires in Banff National Park, 1880 – 1980. Parks Can., Nat. Parks Br., Ottawa, Ontario. Occasional Paper #3
John son E.A. and Larsen, C.P. Larsen. 1991. Climatically induced changes in fire frequency in the Southern Canadian Rockies. Ecology 72: 194-201.
Togeua, M.P. 1996. Understanding age-class distribution in the Southern Canadian Rockies. M.Sc. Thesis University of Alberta, Edmonton. 139 p.
[19] Rogeau, M.P. 1996. Understanding age-class distribution in the Southern Canadian Rockies. M.Sc. Thesis. University of Alberta, Edmonton. 139 p

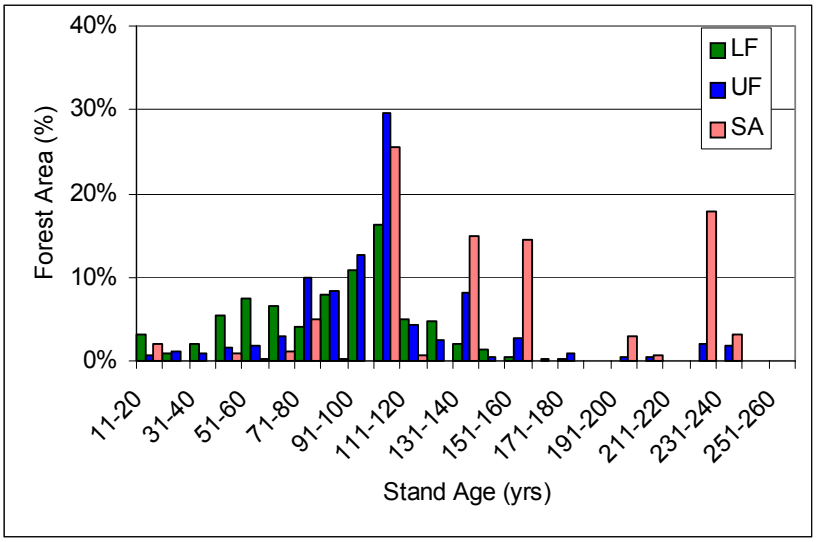

Figure 1-15 Current Relative Age Class Distribution by natural Subregion on the Gross FMA

The Lower Foothills natural subregion shows a significantly younger age class distribution than the Upper Foothills or the Subalpine natural subregions. Forest stands older than 120 years represent 67% of the landscape in the Subalpine, 30% in the Upper Foothills and only 17% in Lower Foothills natural subregions.

The amount of older forests in the Subalpine natural subregion suggests the occurrence of four major fire events in 1760, 1840, 1860 and 1890. The extent of the Subalpine region affected by these fires ranged from 30% in 1890 to 17% in 1840 and 1860. It should be noted that the percentage of area affected by older fire events might be underestimated by the current age class distribution because more recent events may have affected areas previously burned. Low severity or smaller fire events may have also occurred in 1720 and in 1790-1800, but to date have not been detected.

A fire event in the Subalpine would most likely travel long distances and also affect the Upper and Lower Foothills natural subregions. However, in these regions, and particularly in the Lower Foothills, there is little evidence of fire having occurred in the 1700s and 1800s because more recent fires have erased their footprint. The presence of remnant older stands in the Upper Foothills in 1760, 1840 and 1860 provides supporting evidence to suggest those major fire events did affect the Subalpine natural subregion.

The last major fire event occurred in 1890-1900. That fire affected 30% of the Subalpine natural subregion, at least 44% of the Upper Foothills and 34% of the Lower Foothills natural subregion. The fire in the 1890-1900 decade may have extended over a larger area in the Lower Foothills, but a shorter fire cycle in this natural subregion and smaller, more recent fires may have erased some of its footprint.

The area less than 40-50 years of age in the Upper Foothills and Subalpine natural subregions in fire-driven ecosystems may be of concern. It suggests limited habitat availability for wildlife species that depend on early seral stages.[20]

1.2.4.2 Insect and Disease History[21]

There is no information specific to the SYU on the history of insect infestations or disease epidemics. As an informal assessment[22], there has been no significant timber losses (mortality) identified within the past 15 years. Moderate to severe defoliation of aspen from forest tent caterpillar, Malacosoma disstria, was experienced during the mid-1980s, the impact of which is expected to be reductions in growth during those periods. Aspen twig blight, Venturia macularis, and balsam twig blight, Venturia populina are cause for concern in immature forests. These pathogens cause a loss of growth, although the exact extent of damage is unknown.

Table 1-12 to Table 1-14 show the known insects and diseases that are present and their impact on tree growth.

1.2.4.3 Fire History

Fire history data was obtained from the Public Lands and Forests Division (PLFD) from 1961 to December 31st, 2003 inclusive. During this period, 750 fires have burned a total area of over 17,100 hectares. The following tables, Table1-15, Table 1-16 and Table 1-17 summarize the data by cause, class, and year. The Fire History Map (Map 1-7) provides the spatial location of each recorded fire-by-fire class.

[20] Lyon, L.J., Huff, M.H., Hooper, R.G., Telfer, E.S., Schreiner, D.S., and Smith, J.K. 2000. Wildland Fire in Ecosystems: effects of fire on fauna. USDA For. Serv. Gen. Tech. Rep. RMRS-GTR – 42 vol 1, Ogden, UT.
[21] Forest insect and disease conditions in west central Canada (Northern Forestry Center) from 1985 to 1995.
Insects and Disease reports (Alberta Sustainable Resource Development Protection) from 1996-2000.
Forest tree disease of the prairie provinces (Y. Hiratsuka).
Tree and shrub insects of the Prairie Provinces (Ives, W.G.H. and Wong, H.R.)
[22] Forest Insect and Disease Reports, Natural Resources Canada; pers. Com. With James Brandt (Head of Forest Insect and Disease Survey with Forestry Canada) and Albert Sproule (Public Lands and Forests Division).

Table 1-12 Mature and Immature Stand Pests of Trembling Aspen (*Populus tremuloides*) and Balsam Poplar (*Populus balsamifera*)

Damage Agent	Damage	History
Bruce spanworm (*Operophtera bruceta*)	There is typically a loss of radial increment during an outbreak, but no mortality directly attributable to the insect.	Some recent activity (1999-2000) noted within the Willesden Green LMU.
Forest tent caterpillar *Malacosoma disstria)*	Two or more years of moderate to severe defoliation cause severe reduction in radial growth and considerable branch and twig mortality. Little mortality attributable to the defoliation of the tree.	Large outbreak in 1987 in the Willesden Green, Sand Creek, O'Chiese, and Baptiste LMUs. In 1989, there was moderate to severe defoliation in the Willesden Green LMU.
Large Aspen tortix *(Choristoneura conflictana)*	Defoliation causes a reduction in the radial increment of the tree, but outbreaks seldom last long enough to cause any appreciable tree mortality.	In 1992 there was moderate to severe defoliation reported in the Baptiste LMU.
Poplar borer *(Saperda calcarata)*	Trees are not usually killed by poplar borer attack, even when riddled with tunnels, but weakened stems are liable to break during windstorms and the wood is almost useless for lumber or other purposes.	Larval activity common in native aspen stands.
Aspen leaf-roller *(Pseudexentera oregonana)*	Little damage is done to trees.	Present throughout the Eastern half of the SYU in small populations.
Hypoxolon canker *(Hypoxylon mammatum)*	Disease is considered to be more secondary in nature, usually occurring in trees already under stress. Trees with infections on the lower main stem usually die, due to weakening of the main stem.	Occurred throughout the Willesden Green, Sand Creek, Baptiste, and O'Chiese LMUs. Essentially all LMUs that have aspen present.
Armillaria root rot *(A. ostoyae)*	Small-infected trees are usually killed quickly; large trees may have reduced growth but keep growing for a long time despite the presence of the fungus. This disease kills trees already weakened by other environmental factors.	Common
Venturia leaf and shoot blight *(Venturia macularis)*	When most of the tender shoots of young trees are attacked, the trees are disfigured and growth is severely affected.	Most prevalent pest of young aspen. Common.
False tinder conk *(Phellinus tremulae)*	Damage to deciduous trees includes weakening of the stem due to reduction in structural integrity of the stem.	Common

Table 1-13 Mature and Immature Stand Pests of Lodgepole Pine (*Pinus contorta*)

Damage Agent	Damage	History
Northern Pitch Twig Moth *(Petrova albicapitana)*	The feeding of the moth causes injury to the stem and can cause breakage or stem deformities.	High population observed attacking pine regeneration in 1995 in the Rocky-Clearwater forest.
Root collar weevil *(Hylobius sp.)*	Feeding kills young trees and is one of the most significant entry courts for root rot and other disease organisms on older trees.	Common.
Pine needle cast *(Lophodermella concolor, Davisomycella ampla, Elytroderma deformans)*	This disease has not been proven to significantly affect the health of large trees, although extensive defoliation can affect the growth and shape of the trees.	Light infestations were reported in the Rocky Mountain House region in 1985. In 1991, severe discoloration of trees occurred in the same region.
Western Gall Rust *(Endocronartium harknessii)*	Main stem galls often kill young trees. Trees with main stem galls tend to be deformed and easy to break at the gall.	Common at a low incidence among most young regeneration within the Nordegg River, Blackstone, and Marshy Bank LMUs.
Atropellis canker *(Atropellis piniphila)*	Heavy resin flow results in a debarking problem that can increase costs of processing. Discoloration of wood caused by the disease degrades lumber, and stem deformities also degrade the worth of the tree for sawmills.	Present in the Nordegg River and Blackstone, and Baptiste LMUs. Commonly found on lodegpole pine near Rocky Mountain House.
Pine needle rust *(Coleosporium asterum)*	Generally, the disease does not cause significant damage, but repeated heavy infections year after year could significantly reduce the growth of small trees.	Light to moderate infections present throughout the Nordegg River, Blackstone, Baptiste, O'Chiese, and Marshy Bank LMUs.
Armillaria root rot*(A.ostoyae)*	Small infected trees are usually killed quickly; large trees may have reduced growth but keep growing for a long time despite the presence of the fungus. This disease kills trees already weakened by other environmental factors.	Present in young regenerating stands and in overmature stands.
Mountain Pine Beetle (*Dendroctonus ponderosae*)	Beetles attacking trees will either fully or partially kill a tree, dependant upon full or partial girdling of the cambium layer. Trees successfully attacked are killed outright. Sapwood turns blue due to the introduction of a fungus.	Not present, however presence in adjacent forest areas may act as sources of invading beetle populations.

Table 1-14 Mature and Immature Stand pests of White Spruce (*Picea glauca*)

Damage Agent	Damage	History
Spruce budworm *(Choristoneura fumiferana)*	Short periods of defoliation cause a marked reduction in radial increment; prolonged outbreaks cause severe branch and, ultimately, tree mortality.	Very light populations reported on the Eastern side of the SYU.
Spruce beetle *(Dendroctonus rufipennis)*	Damage occurs from beetles attacking and killing standing timber, especially if large numbers of beetles are present following fires, windstorms, or logging operations. A blue-stain fungus is also transmitted by the beetle.	Small infestations have been reported, but nothing substantial.
Root collar weevil *(Hylobius sp.)*	Feeding kills young trees and is one of the most significant entry courts for root rot and other disease organisms on older trees.	Common
Spruce needle rust *(Chrysomyxa sp.)*and Yellow witches' broom *(Chrysomyxa arctostaphli)*	Infection can lead to where almost all of the current year's growth is dropped off prematurely. Heavy infections seldom occur in successive years. No significant damage.	Common
Armillaria root rot *(A. ostoyae)*	Small infected trees are usually killed quickly; large trees may have reduced growth but keep growing for a long time despite the presence of the fungus. This disease kills trees already weakened by other environmental factors.	Common

Table1-15 Fires by Cause (to Dec. 31, 2003)

Cause	Number of Fires	Area (ha.)	% of Area Burned
Lightning	306	8304	49.08
Man	444	8615	50.92

Table 1-16 Fires by Class (to Dec. 31, 2003)

Fire Class	Number of Fires	Area (ha.)	% of Area Burned
1 – A = < 0.1 ha	510	42.13	0.025
2 – B = 0.11 to 4.0 ha	219	268.0	1.57
3 – C = 4.1 ha to 40.0 ha	15	298.3	1.74
4 – D = 40.1 to 200 ha	4	403.6	2.36
5 – E = > 200 ha	5	16,108	94.09

Table 1-17 Fires by Year (to Dec. 31, 2003)

Year	Number of Fires	Area (ha.)
1961	27	127.9
1962	10	1.9
1963	13	11.0
1964	8	0.8
1965	5	0.5
1966	7	7.5
1967	6	10.3
1968	14	6.1
1969	16	2,964.8
1970	13	9.9
1971	11	23.0
1972	4	2.3
1973	12	5.0
1974	23	40.8
1975	25	12.4
1976	11	19.8
1977	25	57.2
1978	16	32.2
1979	42	3,708.7
1980	8	8.4
1981	11	4.0
1982	18	24.0
1983	11	4.0
1984	40	17.2
1985	21	10.9
1986	3	68.7
1987	32	26.2
1988	22	8,143.2
1989	15	3.8
1990	9	1.0
1991	10	1.2
1992	16	8.8
1993	9	15.2
1994	13	3.1
1995	15	9.2
1996	11	1.55
1997	21	1,14.9
1998	17	7.2
1999	8	8.0
2000	16	16.2
2001	25	106.8
2002	56	1,332.4
2003	54	201.4

1.2.4.4 Forest Fire Risk

Fuel Types

A Fire Behavior Prediction (FBP) potential fuel type map was created (Map 1-8). Descriptions of the fuel types are provided in Table 1-18.

Table 1-18 Fire Behaviour Prediction Relative Proportions

FBP code	Fuel Type	% of SYU Area
C-1	Spruce-Lichen Woodland	3.18%
C-2	Boreal Spruce	39.75%
C-3	Mature Jack or Lodgepole Pine	13.26%
C-4	Immature Jack or Lodgepole Pine	0.51%
C-7	Ponderosa Pine-Douglas Fir	0.05%
D-1	Leafless Aspen	20.27%
M-1	Boreal Mixedwood-Leafless	4.94%
NF	Non Forested	5.73%
O1a	Grass	7.47%
S-1	Jack or Lodgepole Pine Slash	0.00%
WA	Water	1.03%
Unknown	N/A	3.80%

Crowning Susceptibility Model (CroSuM)

The Crown Susceptibility Model (Table 1-19) utilizes AVI similar to the FBP system. The Model assigns an overall susceptibility rating to each AVI polygon based on a scoring range, spatially delineating those areas with the highest susceptibility to crowning. The model assesses AVI attributes associated with the components of crowning. These include cover type, crown closure (density), ladder fuels (vertical fuel continuity) and crown bulk density. Map 1-9 shows the CroSuM output for the unit.

Table 1-19 Crowning Susceptibility Rating Distribution in the SYU Area

Rank	% of SYU Area	SYU Area (ha)
Extreme	2.48	12,925
High	30.45	158,629
Low	29.04	151,270
Moderate	22.07	114,959
No Data	15.95	83,094
Grand Total	100.00	520,877

Map 1-7 Fire History

Map 1-8 Fuel Type - Fire Behaviour Prediction (FBP)

Map 1-9 Crowning Susceptibility Model (CroSuM) Ranking

1.2.5 Fish & Wildlife Resources

The Unit is known for its abundant wildlife resources and its value for hunting, as well as for non-consumptive forms of outdoor recreation, such as camping and hiking. Hunting by Aboriginals in the Area is also a significant activity. The diverse environment supports a wide range of forest types from pure aspen stands to mixedwood and pure conifer stands as well as muskeg and riparian areas. This diversity also supports a wide variety of wildlife and plant species. The North Saskatchewan, Brazeau, Blackstone and Wapiabi River valleys are an important feature for many of the species.

Since the winter of 1994-95, Weyerhaeuser has undertaken an extensive field research program to provide baseline data (furbearers, raptors and songbirds) that will be used as a benchmark for future monitoring. Some of the data is needed at the stand level of our ecologically-based forest management approach to assess relationships between species and stand structure. Other data provides fine-filter inventory information that will help Weyerhaeuser plan its forest management to deal with threatened wildlife species as well as species of recreational value.

1.2.5.1 Avifauna

Bird surveys were conducted during the winter of 1994 and 1995 and during the summers of 1997, 1998, 2001 and 2004. A total of 170 different bird species were recorded, reflecting the size and diversity of bird populations in the Drayton Valley FMA Area. Winter bird counts were done to determine the number of bird species present and their relative abundance, and to assess species-specific relationships with stand structure and composition. These counts along transects were complemented by nocturnal counts using playbacks of owl vocalizations along predetermined vehicular routes. Breeding bird surveys (neotropical birds) were done with the objective of identifying species-stand structure associations.

a) Abundant Bird Species:

The six most abundant bird species found in the Drayton Valley FMA Area were the

1) Yellow-rumped Warbler
2) Swainson's Thrush
3) Ruby-crowned Kinglet
4) Chipping Sparrow
5) Red-breasted Nuthatch
6) White-throated sparrow

Within this group there appeared to be no common or definitive habitat associations.

One of the more common bird species in the Drayton Valley FMA Area is the Yellow-rumped Warbler. It breeds in coniferous woods but prefers open, mature stands that have dead standing trees interspersed throughout. This warbler will occasionally nest in stands of black spruce or areas of muskeg. The Chipping Sparrow was found in mixedwood and conifer stands, where it occupied openings and edges of woodlands, and in open deciduous forests. The Ruby-crowned Kinglet breeds primarily in coniferous and mixed wood forests, but can also be found in black spruce and tamarack stands.

Two species that had not been previously confirmed on the FMA were identified in the 2004 survey. These two new species were the Merlin and the Canvasback Duck.

b) Raptors (Table 1-20)

Diurnal - The Peregrine Falcon has been classified as "at risk" by the provincial ranking system. Sightings are rare within the Drayton Valley FMA Area, but surveys indicate an active nest on the south side of the Brazeau reservoir. Peregrines prefer to nest on cliffs along major rivers and use nearby fields, swamps and marshes for hunting.

Nocturnal - Aspen Resources Consulting conducted nocturnal raptor surveys in the Drayton Valley FMA Area during 1998, 1999 and 2002. During the 1999 and 2002 surveys, the Northern Saw-whet Owl was the most frequently sighted owl, followed by the Boreal Owl. One of the more recognizable raptors within the FMA Area is the Great Gray Owl. Sightings within the FMA are very uncommon. The Great Gray Owl can be found in conifer, deciduous or mixedwood stands, but the preferred nesting sites appear to be mature poplar stands near muskegs and marshes.

The Northern Pygmy Owl is unique to the Rocky Mountain/Foothills natural region. It was observed twice during the 1998 bird survey, both times in mature white spruce stands, and once during the 1999 survey. This owl tolerates a broad range of habitats, but prefers conifer-dominated mixedwood stands with small openings that allow for hunting opportunities. These birds are non-migratory and nest in abandoned woodpecker cavities. Another raptor found in the FMA Area is the Short Eared Owl. It is uncommon in the Drayton Valley FMA Area.

Table 1-20 Raptors That Occur (Shaded), or Likely to Occur, on the FMA*

Common Name	Scientific Name	COSEWIC Status	AB Status Rank (2004 or most current date)	Legal Designation (provincial & national)
American Kestrel	*Falco sparverius*		secure	
Bald Eagle	*Haliaeetus leucocephalus*	Not at risk	sensitive	
Barred Owl	*Strix varia*		sensitive	
Boreal Owl	*Aegolius funereus*	Not at risk	secure	
Broad-winged Hawk	*Buteo platypterus*		sensitive	
Cooper's Hawk	*Accipiter cooperii*	Not at risk	secure	
Golden Eagle	*Aquila chrysaetos*	Not at risk	sensitive	
Great Grey Owl	*Strix nebulosa*	Not at risk	sensitive	
Great Horned Owl	*Bubo virginianus*		secure	
Long-eared Owl	*Asio otus*		secure	
Merlin	*Falco columbarius*	Not at risk	secure	
Northern Goshawk	*Accipiter gentilis*	Not at risk	sensitive	
Northern Harrier	*Circus cyaneus*	Not at risk	secure	
Northern Hawk Owl	*Surnia ulula*	Not at risk	secure	
Northern Pygmy Owl	*Glaucidium gnoma*		sensitive	
Northern Saw-whet Owl	*Aegolius acadicus*		secure	
Osprey	*Pandion haliaetus*		sensitive	
Peregrine Falcon	*Falco peregrinus*	Threatened	at risk	Threatened (AB Wildlife Act, Federal Species at Risk Act)
Red-tailed Hawk	*Buteo jamaicensis*	Not at risk	secure	
Rough Legged Hawk	*Buteo lagopus*		secure	
Sharp-shinned Hawk	*Accipiter striatus*	Not at risk	secure	
Short-eared Owl	*Asio flammeus*	Special Concern	may be at risk	
Swainson's Hawk	*Buteo swainsoni*		sensitive	

*This list identifies species that are confirmed to occur in the FMA by Weyerhaeuser sponsored research and monitoring programs (highlighted in green) as well as species that are likely to occur on the FMA as based on literature review, habitat associations and Alberta Fish and Wildlife sources.[1]

[1]Drayton Valley Sustainable Forest Management Plan, Feb. 2003
[2]Committee on the Status of Endangered Wildlife in Canada

c) Woodpeckers (Table 1-21):

Woodpeckers are considered key species within a habitat. Their presence can serve as an indicator of the overall health of the ecosystem. Several different species of woodpecker occur in the Drayton Valley FMA Area: Three-toed Woodpecker, Pileated Woodpecker, Northern Flicker, Black-backed Woodpecker and Downy Woodpecker.

The Downy Woodpecker and the Northern Flicker were sighted more often than the other species. Both the Black-backed and the Pileated Woodpecker are classified as "sensitive" by the provincial ranking system.

The Black-backed Woodpecker requires mature conifer forests that have standing dead trees for nesting, perching and providing foraging opportunities. These woodpeckers are not exclusive to conifer stands however, and can be found in dense mixedwood forests. The Black-backed Woodpecker often chooses nest sites in the decaying trees of burned areas or areas that have been previously harvested. They do not migrate and will overwinter in their home range.

The Pileated Woodpecker is relatively uncommon in the Drayton Valley FMA Area. There were only two sightings in the 1998 survey, one during the 1997 survey, and three in the 2004 survey. Pileated woodpeckers occupy dense, close-canopied forests that have large mature trees and decaying snags for nesting sites. Unlike other woodpeckers, this species rarely occurs in burns or other areas of downed timber. Pileated woodpeckers prefer dead deciduous trees for nesting and tend to excavate and occupy a new cavity every year. They are also non-migratory and overwinter in their home range.

The Northern Flicker is relatively abundant and can be found throughout Alberta and the Drayton Valley FMA Area. They prefer moderately open habitats in mixedwood, deciduous or coniferous forests, and will excavate cavities in decaying deciduous trees. Northern Flickers can be found at forest edges, in logged areas or burns. These birds are migrants and do not overwinter in Alberta. Although Northern Flickers are more abundant than some woodpecker species, there were only three recorded sightings during the 1997 survey, and two during the 2004 survey.

d) Waterfowl (Table 1-22):

Several bird species in the FMA Area require water as an essential part of their habitat, including the Harlequin Duck, American Dipper, Barrows Goldeneye, Trumpeter Swan, Sandhill Crane and Great Blue Heron. The Harlequin Duck requires fast flowing mountain streams as part of its breeding habitat. Forests or patches of willow and alder surround most of the streams they choose to inhabit. Because these colorful ducks require pristine stream conditions for successful breeding, they are susceptible to detrimental effects on stream ecology. They are also sensitive to human disturbance, including activities such as mining, logging or grazing. During the breeding bird surveys in Drayton Valley, Harlequin Ducks were observed on the Blackstone River in the Upper Foothills section of the FMA Area. According to provincial species lists, these ducks are listed as "sensitive" and are considered rare.

Table 1-21 Woodpeckers That Occur (Shaded), or Likely to Occur, on the FMA*

Common Name	Scientific Name	COSEWIC Status	AB Status Rank (2004 or most current date)	Legal Designation (provincial & national)
Black-backed Woodpecker	*Picoides arcticus*		sensitive	
Downy Woodpecker	*Picoides pubescens*		secure	
Hairy Woodpecker	*Picoides villosus*		secure	
Northern Flicker	*Colaptes auratus*		secure	
Pileated Woodpecker	*Dryocopus pileatus*		sensitive	
Three-toed Woodpecker	*Picoides tridactylus*		secure	
Yellow-bellied Sapsucker	*Sphyrapicus varius*		secure	

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[1]Drayton Valley Sustainable Forest Management Plan, Feb. 2003
[2]Committee on the Status of Endangered Wildlife in Canada

Table 1-22 Waterfowl That Occur (Shaded) or Likely to Occur, on the FMA*

Common Name	Scientific Name	COSEWIC Status	AB Status Rank (2004 or most current date)	Legal Designation (provincial & national)
American Coot	*Fulica americana*	Not at risk	secure	
American Green-winged Teal	*Anas crecca*		secure	
American Wigeon	*Anas americana*		secure	
Barrow's Goldeneye	*Bucephala islandica*		secure	
Blue-winged Teal	*Anas discors*		secure	
Bufflehead	*Bucephala albeola*		secure	
Canada Goose	*Branta canadensis*		secure	
Canvasback	*Aythya valisneria*		secure	
Cinnamon Teal	*Anas cynoptera*		secure	
Common Goldeneye	*Bucephala clangula*		secure	

Common Name	Scientific Name	COSEWIC Status	AB Status Rank (2004 or most current date)	Legal Designation (provincial & national)
Common Loon	*Gavia immer*	Not at risk	secure	
Common Merganser	*Mergus merganser*		secure	
Eared Grebe	*Podiceps nigricollis*		secure	
Gadwall	*Anas strepera*		secure	
Harlequin Duck	*Histrionicus histrionicus*		sensitive	
Hooded Merganser	*Lophodytes cucullatus*		secure	
Horned Grebe	*Podiceps auritus*		sensitive	
Lesser Scaup	*Aythya affinis*		secure	
Mallard	*Anas platyrhynchos*		secure	
Northern Pintail	*Anas acuta*		secure	
Northern Shoveler	*Anas clypeata*		secure	
Pied-billed Grebe	*Podilymbus podiceps*		sensitive	
Redhead	*Aythya americana*		secure	
Red-breasted Merganser	*Mergus serrator*		secure	
Red-necked Grebe	*Podiceps grisegna*	Not at risk	secure	
Ring-necked Duck	*Aythya collaris*		secure	
Ruddy Duck	*Oxyura jamaicensis*		secure	
Surf Scoter	*Melanitta perspicillata*		secure	
Trumpeter Swan	*Cygnus buccinator*	Not at risk	at risk	Threatened (AB Wildlife Act)
Tundra Swan	*Cygnus columbianus*		secure	
White-winged Scoter	*Melanitta fusca*		sensitive	

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Another bird classified as "sensitive" that has a strong association with clean, fast-flowing water, is the American Dipper. This bird will nest on ledges beside or near the water body. If streams remain open through the year, the American Dipper will often overwinter in the area. These birds, like the Harlequin Duck, are sensitive to water quality and may be negatively affected by pollution. During the 1998 survey, up to seven Dippers were observed along the Blackstone River. This bird is unique to the Rocky Mountain/Foothills natural region.

Two of the remaining species, the Great Blue Heron and the Sandhill Crane, have fairly specific habitat requirements. The Great Blue Heron is found in and about open, shallow water, including lake edges, streams, rivers, ponds, sloughs and marshes. They nest near the shoreline or on islands surrounded by water. Herons are colonial birds that return each year to the same breeding grounds, and prefer to nest high in aspen, black poplar or white spruce trees. Their populations are under pressure and consideration should be given to protecting their habitat from human disturbance.

The Sandhill Crane is another species that requires large marshes, bogs, and sloughs for successful breeding. They often feed in open areas adjacent to wetland, such as meadows or older harvested areas. This species returns to the same breeding ground each year, and requires secluded and undisturbed sites for nesting. There were only two recorded observations of the Sandhill Crane during the bird surveys, both in older harvest areas. Both the Great Blue Heron and the Sandhill Crane are on the provincial list and are considered "sensitive" species.

Trumpeter Swans are a migratory bird, and the few sightings in the FMA Area may be attributed to birds on route to their summer nesting grounds or on their way south for the winter. Although these birds are not generally found in the Drayton Valley area, their occasional presence is important.

The Barrows Goldeneye is a waterfowl species that is unique to the Rocky Mountain/Foothills natural region. They are commonly found throughout the FMA Area, occupying ponds, sloughs and small lakes.

e) Neotropical Migrants and Short Distance Migrants (Table 1-23):

The Drayton Valley FMA Area contains a mixture of resident birds and neotropical migrants. Neotropical migrants breed primarily in Canada and the United States, and winter between the Tropics of Cancer and Capricorn.

Table 1-23 Migrant Birds That Occur (Shaded), or Likely to Occur, On the FMA*

Common Name	Scientific Name	COSEWIC Status	AB Status Rank (2004 or most current date)	Legal Designation (provincial & national)
Alder Flycatcher	*Empidonax alnorum*		secure	
American Avocet	*Recurvirostra americana*		secure	
American Bittern	*Botaurus lentiginosus*		sensitive	
American Crow	*Corvus brachyrhynchos*		secure	
American Dipper	*Cinclus mexicanus*		secure	
American Goldfinch	*Carduelis tristis*		secure	
American (Water) Pipet	*Anthus rubescens*		secure	
American Redstart	*Setophaga ruticulla*		secure	
American Robin	*Turdus migratorius*		secure	
American Tree Sparrow	*Spizella arborea*		secure	
Baltimore (Northern) Oriole	*Icterus galbula*		secure	
Bank Swallow	*Riparia riparia*		secure	
Barn Swallow	*Hirundo rustica*		secure	
Bay-breasted Warbler	*Dendroica castanea*		sensitive	
Belted Kingfisher	*Ceryle alcyon*		secure	
Black and White Warbler	*Mniotilta varia*		secure	
Black Tern	*Chlidonias niger*	Not at risk	sensitive	
Black-bellied Plover	*Pluvialis squatarola*		secure	
Blackpoll Warbler	*Dendroica striata*		secure	
Black-throated Blue Warbler	*Dendroica caerulescens*		accidental/vagrant	
Black-throated Green Warbler	*Dendroica virens*		sensitive	
Blue-headed Vireo (Solitary Vireo)	*Vireo solitarius*		secure	
Bohemian Waxwing	*Bombycilla garrulus*		secure	
Bonaparte's Gull	*Larus philidelphia*		secure	
Brewer's Blackbird	*Euphagus cyanocephalus*		secure	
Brewer's Sparrow	*Spizella breweri*		sensitive	
Brown-headed Cowbird	*Molothrus ater*		secure	
Bullock's (Northern) Oriole	*Icterus bullockii*		undetermined	
California Gull	*Larus californicus*		secure	

Common Name	Scientific Name	COSEWIC Status	AB Status Rank (2004 or most current date)	Legal Designation (provincial & national)
Canada Warbler	*Wilsonia canadensis*		sensitive	
Cape May Warbler	*Dendroica tigrina*		sensitive	
Cedar Waxwing	*Bombycilla cedrorum*		secure	
Chipping Sparrow	*Spizella passerina*		secure	
Clay-coloured Sparrow	*Spizella pallida*		secure	
Cliff Swallow	*Petrochelidon pyrrhonota*		secure	
Common Grackle	*Quiscalus quiscula*		secure	
Common Nighthawk	*Chordeiles minor*		sensitive	
Common Snipe	*Gallinago gallinago*		secure	
Common Tern	*Sterna hirundo*	Not at risk	secure	
Common Yellowthroat	*Geothlypis trichas*		secure	
Connecticut Warbler	*Oporornis agilis*		secure	
Cordilleran Flycatcher	*Empidonax occidentalis*		undetermined	
Dark-eyed Junco	*Junco hyemalis*		secure	
Double-crested Cormorant	*Phalacrocorax auritus*	Not at risk	secure	
Dusky Flycatcher	*Empidonax oberholseri*		secure	
Eastern Kingbird	*Tyrannus tyrannus*		secure	
Eastern Phoebe	*Sayornis phoebe*		secure	
Forster's Tern	*Sterna forsteri*	Data deficient	sensitive	
Fox Sparrow	*Passerella iliaca*		secure	
Franklin’s Gull	*Larus pipixcan*		secure	
Golden-crowned Kinglet	*Regulus satrapa*		secure	
Golden-crowned Sparrow	*Zonotrichia altricapilla*		secure	
Great Blue Heron	*Ardea herodias*		sensitive	
Greater Scaup	*Aythya marila*		secure	
Greater Yellowlegs	*Tringa melanoleuca*		secure	
Hammond's Flycatcher	*Empidonax hammondii*		secure	
Hermit Thrush	*Catharus guttatus*		secure	
Herring Gull	*Larus argentatus*		secure	
Hoary Redpoll	*Carduelis hornemanni*		secure	
Horned Lark	*Eremophila alpestris*		secure	

Common Name	Scientific Name	COSEWIC Status	AB Status Rank (2004 or most current date)	Legal Designation (provincial & national)
House Wren	*Troglodytes aedon*		secure	
Killdeer	*Charadrius vociferus*		secure	
Le Conte's Sparrow	*Ammodramus leconteii*		secure	
Least Flycatcher	*Empidonax minimus*		secure	
Least Sandpiper	*Calidris minutilla*		secure	
Lesser Yellowlegs	*Tringa flavipes*		secure	
Lincoln's Sparrow	*Melospiza lincolnii*		secure	
Long-billed Dowitcher	*Limnodromus scolopaceus*		secure	
Magnolia Warbler	*Dendroica magnolia*		secure	
Mountain Bluebird	*Sialia currucoides*		secure	
Mourning Dove	*Zenaida macroura*		secure	
Mourning Warbler	*Oporornis philadelphia*		secure	
Nelson's Sharp-tailed Sparrow	*Ammodramus nelsoni*		secure	
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*		secure	
Northern Shrike	*Lanius excubitor*		secure	
Northern Waterthrush	*Seiurus noveboracensis*		secure	
Olive-sided Flycatcher	*Contopus cooperi*		secure	
Orange-crowned Warbler	*Vermivora celata*		secure	
Ovenbird	*Seiurus aurocapillus*		secure	
Palm Warbler	*Dendroica palmarum*		secure	
Pectoral Sandpiper	*Calidris melanotos*		secure	
Philadelphia Vireo	*Vireo philadelphicus*		secure	
Pine Siskin	*Carduelis pinus*		secure	
Purple Finch	*Carpodacus purpureus*		secure	
Purple Martin	*Progne subis*		sensitive	
Red-eyed Vireo	*Vireo olivaceus*		secure	
Red-necked Phalarope	*Phalaropus lobatus*		secure	
Red-winged Blackbird	*Agelaius phoeniceus*		secure	
Ring-billed Gull	*Larus delawarensis*		secure	
Rock Wren	*Salpinctes obsoletus*		secure	
Rose-breasted Grosbeak	*Pheucticus ludovicianus*		secure	

Common Name	Scientific Name	COSEWIC Status	AB Status Rank (2004 or most current date)	Legal Designation (provincial & national)
Ruby-crowned Kinglet	*Regulus calendula*		secure	
Ruby-throated Hummingbird	*Archilochus colubris*		secure	
Rufous Hummingbird	*Selasphorus rufus*		secure	
Rusty Blackbird	*Euphagus carolinus*		secure	
Sandhill Crane	*Grus canadensis*		sensitive	
Savannah Sparrow	*Passerculus sandwichensis*		secure	
Say's Pheobe	*Sayornis saya*		secure	
Semipalmated Sandpiper	*Calidris pusilla*		secure	
Snow Bunting	*Plectrophenax nivalis*		secure	
Solitary Sandpiper	*Tringa solitaria*		secure	
Song Sparrow	*Melospiza melodia*		secure	
Sora	*Porzana carolina*		secure	
Spotted Sandpiper	*Actitus macularia*		secure	
Stilt Sandpiper	*Calidris himantopus*		secure	
Swainson's Thrush	*Catharus ustulatus*		secure	
Swamp Sparrow	*Melospiza georgiana*		secure	
Tennessee Warbler	*Vermivora peregrina*		secure	
Townsend's Solitaire	*Myadestes townsendi*		secure	
Townsend's Warbler	*Dendroica townsendi*		secure	
Tree Swallow	*Tachycineta bicolor*		secure	
Varied Thrush	*Ixoreus naevius*		secure	
Veery	*Catharus fuscescens*		secure	
Vesper Sparrow	*Pooecetes gramineus*		secure	
Violet-green Swallow	*Tachycineta thalassina*		secure	
Warbling Vireo	*Vireo gilvus*		secure	
Western Grebe	*Aechemophorus occidentalis*		sensitive	
Western Meadowlark	*Sturnella neglecta*		secure	
Western Tanager	*Piranga ludoviciana*		sensitive	
Western Wood-peewee	*Contopus sordidulus*		secure	
White-crowned Sparrow	*Zonotrichia leucophrys*		secure	
White-throated Sparrow	*Zonotrichia albicollis*		secure	

Common Name	Scientific Name	COSEWIC Status	AB Status Rank (2004 or most current date)	Legal Designation (provincial & national)
Willow Flycatcher	*Empidonax trailii*		secure	
Wilson's Phalarope	*Phalaropus tricolor*		secure	
Wilson's Warbler	*Wilsonia pusilla*		secure	
Winter Wren	*Troglodytes troglodytes*		secure	
Yellow Warbler	*Dendroica petechia*		secure	
Yellow-bellied Flycatcher	*Empidonax flaviventris*		Undetermined	
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*		secure	
Yellow-rumped Warbler	*Dendroica coronata*		secure	

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The Black-throated Green Warbler is considered "sensitive" by Alberta. This warbler prefers mature conifer stands or mixedwood stands that have a large amount of white spruce. The Cape May Warbler is also listed as "sensitive" and prefers to breed in dense, mature spruce stands or conifer-dominated mixedwood forests. Both birds have been observed in the FMA Area. The Clay-colored Sparrow is also found in mixedwood stands in the FMA Area. They breed in meadows, brushy openings in mixedwood stands, old burns, and thickets along waterways. The Cordilleran Flycatcher is a species considered unique to the Rocky Mountain/Foothills natural region. It can be found in open, somewhat shady, deciduous or conifer-dominated mixedwood stands, usually near stream ravines. This flycatcher was only sighted twice during the 1998 bird survey.

The Olive-sided Flycatcher and the Lincoln's Sparrow are two neotropical migrants commonly found in the FMA Area. The Olive-sided Flycatcher habituates semi-open coniferous or mixedwood forests that have standing dead trees throughout. They can be found along the edges of disturbances, such as those areas that have been recently logged or burned. Within the Drayton Valley FMA Area, the Olive-sided flycatcher was observed in both clearcuts and mixed deciduous and coniferous stands.

The Lincoln's Sparrow is another neotropical migrant commonly found within the FMA Area. These sparrows inhabit wetlands and forest edges along lakes, bogs and openings. Because harvested areas provide forest edges and early successional tree cover, the Lincoln's Sparrow may benefit from logging activity. Sixty-one of these birds were recorded during the 1997 survey and 45 in 1998. Most of the birds identified in the 1998 survey were found in meadows or along the edges of stand openings.

Another bird species unique to the Rocky Mountain/Foothills natural region is the Varied Thrush. During the 1998 survey 100 of these birds were noted, but only 29 were detected in 2004. The Varied Thrush is stand size-dependent and therefore may be sensitive to extensive harvesting. They prefer older conifer stands that have an abundant understorey and a closed canopy. These migratory birds return to the Boreal forest each spring.

Both the American Pipet and the Townsend's Solitaire are migratory birds sighted within the FMA Area and both are considered species unique to the Rocky Mountain/Foothills natural region.

f) Resident Bird Species (Table 1-24):

Resident bird species in the Drayton Valley FMA Area are important components of local ecosystems. Among the more familiar resident species are the Ruffed Grouse, the Boreal Chickadee and the White-winged Crossbill. The Ruffed Grouse is Alberta's most abundant grouse species. It is found primarily in aspen-dominated mixedwood forests, older clearcuts, and immature mixedwood stands. Habitat requirements for the Ruffed Grouse include dense understorey and downed woody debris. Eight grouse were recorded during the 1997 survey, five in 1998, rising to 21 in 2004. The White-winged Crossbill, on the other hand, depends entirely on closed canopy conifer-dominated stands. These birds rely on the conifer seed crops as a food source, and can exhibit population fluctuations when a cone crop fails. The majority of white-winged crossbills found in the Drayton Valley FMA were in over-mature white spruce stands.

Table 1-24 Resident Birds That Occur (Shaded), or Likely to Occur, on the FMA

Common Name	Scientific Name	COSEWIC Status	AB Status Rank (2004 or most current date)	Legal Designation (provincial & national)
Black-billed Magpie	*Pica hudsonia*		secure	
Black-capped Chickadee	*Poecile atricapilla*		secure	
Blue Grouse	*Dendragapus obscurus*		secure	
Blue Jay	*Cyanocitta cristata*		secure	
Boreal Chickadee	*Poecile hudsonica*		secure	
Brown Creeper	*Certhia americana*		undetermined	
Clark's Nutcracker	*Nucifraga columbiana*		secure	
Common Raven	*Corvus corax*		secure	
Common Redpoll	*Carduelis flammea*		secure	
European Starling	*Sturnus vulgaris*		exotic/alien	
Evening Grosbeak	*Coccothraustes vespertinus*		secure	
Gray Jay	*Perisoreus canadensis*		secure	
House Sparrow	*Passer domesticus*		exotic/alien	
Mountain Chickadee	*Poecile gambeli*		secure	
Pine Grosbeak	*Pinicola enucleator*		secure	
Red Crossbill	*Loxia curvirostra*		secure	
Red-breasted Nuthatch	*Sitta canadensis*		secure	
Rock Dove (Rock Pigeon)	*Columba livia*		exotic/alien	
Ruffed Grouse	*Bonasa umbellus*		secure	
Sharp-tailed Grouse	*Tympanuchus phasianellus*		sensitive	
Spruce Grouse	*Falcipennis canadensis*		secure	
Steller's Jay	*Cyanocitta stelleri*		secure	
White-breasted Nuthatch	*Sitta carolinensis*		secure	
White-tailed Ptarmigan	*Lagopus leucurus*		secure	
White-winged Crossbill	*Loxia leucoptera*		secure	
Willow Ptarmigan	*Lagopus lagopus*		secure	

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Boreal Chickadees are another year round species that prefers white spruce-dominated conifer stands. They nest in cavities they have excavated themselves, either in stumps or branch holes. Within the Drayton Valley FMA Area, Boreal Chickadees have been sighted in a variety of habitats, including mature lodgepole pine and mature mixedwood stands.

1.2.5.2 Herpetofauna

Although not diverse, the herpetofauna in the Drayton Valley FMA Area represents a critical biotic element of the foothill ecosystem. In many wetlands, frogs and toads are among the most abundant vertebrates. They are vital to the food web and healthy amphibian populations drive many of the aquatic systems within the FMA Area. Information about herpetofauna comes from a 1995 inventory of the Drayton Valley FMA Area by Westworth and Associates, and a university project completed in 2002 that focused on amphibian habitat research. Three species -- the Western Toad, Wood Frog, and Boreal Chorus Frog -- are locally abundant and regionally widespread. All three species prefer clear shallow wetlands as breeding areas, and all are found within various forest cover types. (Table 1-25)

One hundred sixteen wetland communities were surveyed with audio strip transects to determine the presence, distribution and relative abundance of amphibians. The technique was supplemented by "flush transects," traps, and visual sightings in high probability areas to determine the presence of reptiles and the status of species whose distribution and abundance might be restricted.

An amphibian research program[23] by the University of Alberta was initiated in the summer of 2000. Its objectives were to provide additional information on species occurrence and distribution.

In June 2000, amphibians and reptiles (Table 1-26) were surveyed primarily along small, free-flowing streams and streams dammed by beaver. Time was also spent in marshes, lakes, and bogs. Amphibians and reptiles were extensively searched throughout the FMA, including areas such as the Marshybank Ecological Reserve and surrounding FMA, Lodgepole region, Dismal Creek, Blackstone River and Chungo Creek drainage.

[23] Final Report on Amphibian Research in Drayton Valley Forest Management Area, Weyerhaeuser Canada Ltd., Aug. 27, 2003. Stevens, C.E. and Paszkowski, Dept. Biological Sciences, University of Alberta, pp. 27.

Table 1-25 Amphibians That Occur (Shaded), or likely to occur, on the FMA*

Common Name	Scientific Name	COSEWIC Status	AB Status Rank (2004 or most current date)	Legal Designation (provincial & national)
Canadian Toad	*Bufo hemiophrys*	Not at risk	may be at risk	
Boreal Chorus Frog	*Pseudacris maculata*		secure	
Long-toed Salamander	*Ambystoma macrodactylum*		sensitive	
Northern Leopard frog	*Rana pipiens*	Special Concern	at risk	Threatened (AB Wildlife Act); Special Concern (Federal Species at Risk Act)
Western Toad	*Bufo boreas*	Special Concern	sensitive	Special Concern (Federal Species at Risk Act)
Wood Frog	*Rana sylvatica*		secure	
Columbia Spotted Frog	*Rana luteiventris*	Not at risk	sensitive	
Tiger Salamander	*Ambystoma tigrinum*		secure	

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Table 1-26 Reptiles That Occur (Shaded), or Likely to Occur, On the FMA*

Common Name	Scientific Name	COSEWIC Status	AB Status Rank (2004 or most current date)	Legal Designation (provincial & national)
Red Side Garter Snake	*Thamnophis sirtalis*		sensitive	
Wandering Garter Snake	*Thamnophis elegens*		sensitive	

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Over 140 individual sites were surveyed twice between June and September of 2000. At each site, two 200m transects adjacent and parallel to the aquatic habitat in question were visually surveyed. Weyerhaeuser has also undertaken other initiatives to further our understanding of wildlife species in the Drayton Valley FMA area.

Wood frogs are the most widely distributed amphibian reported in the Drayton Valley FMA Area. They occur in all types of aquatic systems but reach their highest relative abundance in ditches and borrow pits. Boreal Chorus frogs have their greatest numbers in marshes and sedge wetlands, and are not commonly found in areas with flowing water or in temporary wetlands. Boreal toads, on the other hand, are often associated with slow-flowing water such as creeks, streams and some river areas. They are also found in sparsely vegetated wetlands and shallow, abandoned beaver ponds. There was one recorded sighting of a Northern Leopard frog in the early 1980s, but all west central Alberta populations have since disappeared. Garter snakes are known to occur in and around the FMA Area, however these populations are small and widely distributed. Red-sided garter snakes have been recorded in Crimson Lake Provincial Park and along the North Saskatchewan River at the Drayton Valley water treatment plant. Tiger salamanders and spotted frogs may occur in isolated pockets within the FMA Area, but they are not currently prominent ecological components of this region.

During the recent surveys conducted by the University of Alberta, over 600 frogs and toads were counted, of which approximately 90% were wood frogs, 7% boreal toads, and 3% chorus frogs. Of the 600 seen, 400 of these amphibians were actually caught, either by hand or net. Only one case of parasitism and only a couple incidences where the amphibian may have had deformities (i.e. extra digit or disjointed appendage) were observed.

With regards to the distribution of the three species caught, wood frogs and boreal toads were found throughout the FMA, while chorus frogs were primarily limited to the lower foothills or regions east of the Forestry Trunk Road. Some interesting patterns from this first preliminary field season were detected. In particular, wood frogs in the upper foothills were in high densities along mid-order stream (i.e. Lookout and Sturrock Creek) and around lakes with a grassy riparian zone (i.e. Marshybank Lake). Wood frogs along the mid-order streams were often missing appendages, eyes, or digits, which may be a result of fish predation.

1.2.5.3 Ungulates

Elk populations in the Rocky Mountain House-Nordegg area are monitored by Fish and Wildlife Division through surveys of designated winter ranges. Twenty-three of these ranges have been continuously monitored since 1974 by Fish and Wildlife Division. Elk numbers on these 23 ranges have increased from 445 animals in 1974 to 2,243 in 1997.

During the same time, elk numbers on three winter ranges on the western boundary of the FMA Area (George Creek, Brazeau River, and Job Creek) increased from 26 in 1974 to 77 in 1997. Designated elk winter ranges that fall within Weyerhaeuser's FMA Area are O'Chiese, Brazeau Forks, and Horburg. Only the Horburg range has received continuous monitoring. Surveys conducted by Westworth and Associates in 1995 show that elk were most numerous on the northern portion of the FMA Area with the highest numbers recorded on survey blocks near the Brazeau River. Overall density was

reported as 0.11 elk/km². The regional population increased steadily, while the Nordegg elk appeared to peak in the early 1980s (at 142-144 elk).

Elk numbers on the Jackfish winter range, located near the North Saskatchewan River on the southern boundary of the FMA Area, were reported by Fish and Wildlife Division to be 103 elk in 1996 and 78 elk in 1997. Some information on elk use of the Brazeau River valley west of the reservoir is available from various sources, but little is known about the distribution of specific herds.

Weyerhaeuser is currently a supporting partner of the University of Alberta elk study in west central Alberta, together with the Alberta Sustainable Resource Development, Alberta Conservation Association, the Rocky Mountain Elk Foundation and other local stakeholders. The objectives of the study are to study resident and translocated elk to:

1) Develop a reliable sampling protocol for surveying wintering elk in the east central foothills,
2) Determine the optimum sites to successfully release "conditioned" (Banff/Jasper) and "wild" elk (Black Diamond) into the central east slopes elk population, and
3) Model elk habitat selection and determine the effects of land management practices on elk habitat selection.

In addition to current projects, Weyerhaeuser has supported ungulate surveys in the past. Westworth and Associates' surveys in 1995 indicated that moose are the most abundant ungulate on the FMA Area (densities of 0.23 moose/km²). This density is comparable to the 1995/96 Fish and Wildlife Division Northern Moose Program survey of WMU 339, which reported 0.28 moose/km². In 1979 and 1982, moose densities in the Alder Flats area were reported as 0.58 moose/km². Densities and ratios reported in the 1979 and 1982 Alder Flats surveys were higher than those reported for the FMA as a whole in 1995 and for WMU 339 in 1989 and 1995/96.

Fish and Wildlife Division also carried out moose surveys in the Nordegg, Brazeau and Pembina areas in 1975, 1994 and 1998. Portions of the Brazeau area fall within the Drayton Valley FMA Area. The estimated density was 0.27 moose/km². Other surveys throughout the region indicate similar densities. Densities of moose west of the Brazeau reservoir appear to have changed little between surveys although the techniques and areas surveyed were somewhat different. Little is known about moose populations in the Nordegg area west of the Forestry Trunk Road.

Additional surveys carried out by Fish and Wildlife Division in 1999, 2001 and 2004 indicated that moose densities were relatively constant at 0.27 moose/km2, 0.26 moose/km2, and 0.26 moose/km2 respectively.

Both white-tailed deer and mule deer are moderately abundant in the area. The highest numbers of mule and white-tailed deer in Weyerhaeuser's Drayton Valley FMA Area are reported near the North Saskatchewan River. According to Westworth surveys, in 1995, densities were 0.15/km² and 0.21/km² for mule deer and white-tailed deer respectively.

Data from Fish and Wildlife Division indicate that there are six designated bighorn sheep winter ranges in the Rocky Mountain House region between the North Saskatchewan and Brazeau Rivers. These six ranges are: Chungo-Blackstone, First Range-Job Creek, Brazeau-Job Creek, Wapiabi, Windy Point and Cline Point. Survey results for these six ranges between 1973 and 1995 indicate yearly fluctuations in numbers, but total ewes remain at about 200. There are indications of bighorn sheep use of the south banks of the Brazeau River within the Drayton Valley FMA Area. Bighorn sheep will travel long distances through trees if they know their destination. Bighorn sheep on the Brazeau River could be traveling down to the river by way of the ridges extending Northeast from the Front Ranges. It is also possible that the sheep may be part of the Chungo-Blackstone herd. Table 1-27 identifies ungulates that should occur on the SYU and their current status.

1.2.5.4 Furbearers

Eleven species of furbearers occur in the Weyerhaeuser Drayton Valley FMA Area (See Table 1-28). Winter track counts were used to assess their relative abundance and distribution. Based on the 1995, 1999/2000 and 2003 surveys, Snowshoe hare and red squirrel are the most abundant. Snowshoe hare is usually found in old pine stands and mature and immature mixedwood stands, whereas snowshoe hares were found in conifer stands of all ages during the surveys. Red squirrels are associated with mature pine and immature mixedwood stands.

Fisher were uncommon in the surveys, and were recorded in only two stand types, old and mature mixedwood stands in the 1995 survey. They were detected more frequently during the 1999/2000 survey, and were significantly more abundant than expected in mid-seral coniferous stands.

Marten was relatively common in the 1995 survey and were associated with mature pine stands and old mixedwood stands. The scarcity of Marten tracks in the 1999/2000 survey is difficult to explain. Results show that track numbers increased in the 2003 survey.

Weasels were the most common small carnivorous furbearer. They are generally associated with cutover/upland burns. Short tailed weasels were more abundant than expected in the early seral stages and in areas with limited overhead cover. Trapline data indicates that beaver, muskrat, fox, and otter occur in varying numbers throughout the FMA Area as well.

Table 1-27 Ungulates That Occur (Shaded), or Likely to Occur, on the FMA*

Common Name	Scientific Name	COSEWIC Status	AB Status Rank (2004 or most current date)	Legal Designation (provincial & national)
Bighorn Sheep	*Ovis canadensis*		secure	
Elk (Wapiti)	*Cervus elaphus*		secure	
Moose	*Alces alces*		secure	
Mule Deer	*Odocoileus hemionus*		secure	
White-tailed Deer	*Odocoileus virginianus*		secure	

*This list identifies species that are confirmed to occur in the FMA by Weyerhaeuser sponsored research and monitoring programs (highlighted in green) as well as species that are likely to occur on the FMA as based on literature review, habitat associations and Alberta Fish and Wildlife sources.[1]

[1]Drayton Valley Sustainable Forest Management Plan, Feb. 2003
[2]Committee on the Status of Endangered Wildlife in Canada

Table 1-28 Furbearers That Occur (Shaded), or Likely to Occur, on the FMA*

Common Name	Scientific Name	COSEWIC Status	AB Status Rank (2004 or most current date)	Legal Designation (provincial & national)
Fisher	*Martes pennanti*		sensitive	
Least Weasel	*Mustela nivalis*		secure	
Long-tailed Weasel	*Mustela frenata*	Not at risk	may be at risk	
Marten	*Martes americana*		secure	
Mink	*Mustela vison*		secure	
Northern Flying Squirrel	*Glaucomys sabrinus*		secure	
Red Fox	*Vulpes vulpes*		secure	
Red Squirrel	*Tamiasciurus hudsonicus*		secure	
Short-tailed Weasel (Ermine)	*Mustela erminea*		secure	
Snowshoe Hare	*Lepus americanus*		secure	
Wolverine	*Gulo gulo*	Special Concern	may be at risk	

*This list identifies species that are confirmed to occur in the FMA by Weyerhaeuser sponsored research and monitoring programs (highlighted in green) as well as species that are likely to occur on the FMA as based on literature review, habitat associations and Alberta Fish and Wildlife sources.[1]

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1.2.5.5 Large Carnivores

Lynx track frequencies were low in 2000, but increased in 2003. Lynx are associated with mature mixedwood and old pine stands. Coyotes were the second most abundant large carnivore in the 1995 survey, and were generally associated with cutovers, upland burns, old and mature pine stands and mature mixedwood stands.

Wolves occur throughout the FMA Area. Most of the current knowledge about wolves comes from a detailed study of wolf predation on ungulates near Nordegg. Fish and Wildlife Division personnel investigated wolf pack densities, seasonal food habits and predation rates. Ranges of two of the wolves that were monitored, as a result of the wolf transplant to Yellowstone and Idaho, fell within the FMA boundary (Brown Creek and Chungo); ranges of two other wolves were found north of the Brazeau River.

Weyerhaeuser is currently a supporting partner on a large wolf/elk project with the University of Alberta. This study is also supported by Alberta Sustainable Resource Development, the Alberta Conservation Association, the Rocky Mountain Elk Foundation and other local stakeholders. The objectives of the study are to:

1. Document transboundary movements of elk and wolves from the Marshybank study area and identify migration routes across Jasper National Park boundaries.
2. Map the seasonal probability of elk and wolf distribution across the Marshybank study area based on relationships to selected landscape features.
3. Document the sources of mortality for wolves and elk and the effect of local wolf trapping on dispersal and movements of wolf packs in the area.

The home ranges of a number of grizzly bears in the Cairn Pass and Brazeau areas of Jasper National Park extended into the province east of the Brazeau River to Chungo Mountain, and covered part of the FMA Area. One den site was located in the FMA Area. Black bears are also known to occur within the boundaries of the Drayton Valley FMA Area. Table 1-29 identifies large carnivores that should occur on the SYU and their current status.

1.2.5.6 Small Mammals

Little is known about small mammals. The Wapiabi Cave is a known bat hibernaculum. Little Brown Bats (*Myotis lucifugus*) and Long-legged Bats (*Myotis volans*) are reported in the area. Between 1998 and 2000, Weyerhaeuser supported a University of Alberta research project[24] aimed at providing basic inventory information, characterization of roosting and foraging areas and recommendations about the spatial arrangement of roost structures and foraging/activity areas at stand and landscape scales. Table 1-30 identifies small mammals that should occur on the SYU and their current status.

[24] Lippert, Heidi D. 2001. The relationship of Bat activity to habitat type and structure retention in managed boreal forests of west-central Alberta. MSc Thesis, University of Alberta, Edmonton, AB. 86 pp.

Table 1-29 Large Carnivores That Occur (Shaded), or likely to Occur, on the FMA*

Common Name	Scientific Name	COSEWIC Status	AB Status Rank (2004 or most current date)	Legal Designation (provincial & national)
Black bear	*Ursus americanus*	Not at risk	secure	
Canada Lynx	*Lynx canadensis*	Not at risk	sensitive	
Cougar	*Felis concolor*		sensitive	
Coyote	*Canis latrans*		secure	
Grizzly Bear	*Ursus arctos*	Special Concern	may be at risk	
Wolf	*Canis lupus*	Not at risk	secure	

*This list identifies species that are confirmed to occur in the FMA by Weyerhaeuser sponsored research and monitoring programs (highlighted in green) as well as species that are likely to occur on the FMA as based on literature review, habitat associations and Alberta Fish and Wildlife sources.[1]

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[2]Committee on the Status of Endangered Wildlife in Canada

Table 1-30 Small Mammals That Occur (Shaded), or Likely to Occur on the FMA*

Common Name	Scientific Name	COSEWIC Status	AB Status Rank (2004 or most current date)	Legal Designation (provincial & national)
Arctic Shrew	*Sorex arcticus*		secure	
Beaver	*Castor canadensis*		secure	
Big Brown Bat	*Eptesicus fuscus*		secure	
Bushy Tailed Woodrat	*Neotoma cinerea*		secure	
Columbian Ground Squirrel	*Spermophilus columbianus*		secure	
Deer Mouse	*Peromyscus maniculatus*		secure	
Dusky Shrew	*Sorex monticulus*		secure	
Golden-mantled Ground Squirrel	*Spermophilus lateralis*		secure	
Heather Vole	*Phenacomys intermedius*		secure	
Hoary Bat	*Lasiurus cinereus*		secure	
Hoary Marmot	*Marmota caligata*		secure	
Least Chipmunk	*Tamias minimus*		secure	
Little Brown Bat	*Myotis lucifugus*		secure	
Long-eared Bat	*Myotis evotis*		secure	
Long-legged Bat	*Myotis volans*		undetermined	

Common Name	Scientific Name	COSEWIC Status	AB Status Rank (2004 or most current date)	Legal Designation (provincial & national)
Long-tailed Vole	*Microtus longicaudus*		secure	
Masked Shrew	*Sorex cinerus*		secure	
Meadow Jumping Mouse	*Zapus hudsonius*		secure	
Meadow Vole	*Microtus pennsylvanicus*		secure	
Muskrat	*Ondatra zibethicus*		secure	
Northern Long-eared Bat	*Myotis septentrionalis*		may be at risk	
Northern Pocket Gopher	*Thomomys talpoides*		secure	
Pika	*Ochotona princeps*		secure	
Porcupine	*Erithizon dorsatum*		secure	
Pygmy Shrew	*Sorex hoyi*		secure	
Richardson Ground Squirrel	*Spermophilus richardsonii*		secure	
River Otter	*Lutra canadensis*		secure	
Silver-haired Bat	*Lascionycteris noctivagans*		secure	
Southern Red-backed Vole	*Clethrionomys gapperi*		secure	
Striped Skunk	*Mephitus mephitus*		secure	
Thirteen-lined Ground Squirrel	*Spermophilus tridecemlineatus*		undetermined	
Water Shrew	*Sorex palustris*		secure	
Water Vole	*Microtus richardsoni*		sensitive	
Western Jumping Mouse	*Zapus princeps*		secure	
Woodchuck	*Marmota monax*		secure	
Yellow-pine Chipmunk	*Tamias amoenus*		secure	

*This list identifies species that are confirmed to occur in the FMA by Weyerhaeuser sponsored research and monitoring programs (highlighted in green) as well as species that are likely to occur on the FMA as based on literature review, habitat associations and Alberta Fish and Wildlife sources.[1]

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[2]Committee on the Status of Endangered Wildlife in Canada

1.2.5.7 Fisheries

The FMA Area supports a diverse fish fauna, ranging from native cold water sport fish species such as arctic grayling, mountain whitefish and bull trout, to cool water species such as goldeye, burbot, northern pike, and walleye (See Table 1-31). Non-native brook, brown and cutthroat trout have also been stocked into many streams in the FMA Area in the past, to provide recreational fishing opportunities. Non-sport fish species known to exist in drainages throughout the FMA Area include: longnose dace, fathead minnow, pearl dace, finescale dace, Iowa darter, emerald shiner, lake chub, trout perch, longnose sucker, white sucker, mountain sucker, shorthead redhorse sucker, silver redhorse sucker, quilback, spoonhead sculpin, and brook stickleback.

In general, fisheries production in the streams and rivers in the FMA Area is limited by cooler, less productive water, and a shorter growing season. Sport and non-sport fish species are found in habitat ranging from large rivers to small tributary streams. Larger rivers are important for migration, overwintering, rearing, and spawning purposes and the smaller tributary streams are often important as spawning and rearing areas. Recreational angling is popular at lakes, rivers and streams located in the FMA Area. Most of the recreational fishing pressure on the flowing waterbodies occurs on the larger rivers and streams. Access to streams and lakes in the FMA is very good, due to the presence of many roads and cutlines.

Brook trout, brown trout, burbot, northern pike and mountain whitefish are sportfish species known to use the Baptiste River drainage in the southeast corner of the FMA Area. A number of large brook trout populations are present in this area. Brown trout, northern pike, mountain whitefish, goldeye, walleye and lake sturgeon are all known within the North Saskatchewan and the lower Brazeau River drainages (near its confluence). Data collected through the Co-operative Fisheries Inventory Program (CFIP), suggests that the lower sections of many small tributaries to both rivers are utilized by mountain whitefish and brown trout for spawning and rearing purposes. The extent to which the mainstem North Saskatchewan is used by lake sturgeon within Weyerhaeuser's FMA Area is unknown.

The upper section of the Blackstone River and the Wapiabi River drainages support mountain whitefish, bull trout, brook trout and cutthroat trout populations. Data collected through CFIP suggests that bull and brook trout are using the tributaries to the Blackstone and Wapiabi Rivers as well as the mainstem rivers. However, within Weyerhaeuser's FMA Area, cutthroat trout and mountain whitefish seem limited to the mainstems. Bull trout and mountain whitefish are common in the headwater reaches of the Brazeau River.

Table 1-31 Fish That Occur (Shaded), or Likely to Occur, on the FMA*

Common Name	Scientific Name	COSEWIC Status	AB Status Rank (2004 or most current date)	Legal Designation (provincial & national)
Arctic Grayling	*Thymallus arcticus*		sensitive	
Brassy Minnow	*Hybognathus hankinsoni*		undetermined	
Brook Stickleback	*Culaea inconstans*		secure	
Brook Trout	*Salvelinus fontinalis*		exotic/alien	
Brown Trout	*Salmo trutta*		exotic/alien	
Bull Trout	*Salvelinus confluentus*		sensitive	
Burbot	*Lota lota*		secure	
Cisco	*Coregonus artedi*		secure	
Cutthroat Trout	*Oncorhynchus clarki*		secure	
Cutthroat Trout (westslope)	*Oncorhynchus clarki lewisi*	Threatened	Secure	
Emerald Shiner	*Notropis atherinoides*		secure	
Fathead Minnow	*Pimephalus promelas*		secure	
Finescale Dace	*Phoxinus neogaeus*		undetermined	
Flathead Chub	*Platygobio gracilis*		secure	
Goldeye	*Hiodon alosoides*		secure	
Iowa Darter	*Etheostaoma exile*		secure	
Lake Chub	*Couesius plumbeus*		secure	
Lake Sturgeon	*Acipenser fulvescens*	Endangered	undetermined	
Lake Whitefish	*Coregonus clupeaformus*		secure	
Longnose Dace	*Rhinichthys cataractae*		secure	
Longnose Sucker	*Catostumus catostumus*		secure	
Mountain Sucker	*Catostumus platyrynchus*	Not at risk	secure	
Mountain Whitefish	*Prosopium williamsoni*		secure	
Northern Pike	*Esox lucius*		secure	
Northern Redbelly Dace	*Phoxinus eos*		sensitive	
Pearl Dace	*Margariscus margarita*		undetermined	
Pygmy Whitefish	*Prosopium coulteri*		may be at risk	

Common Name	Scientific Name	COSEWIC Status	AB Status Rank (2004 or most current date)	Legal Designation (provincial & national)
Quillback	*Carpiodes cyprinus*		undetermined	
Rainbow Trout	*Oncorhynchus mykiss*		secure	
Sauger	*Stizostedion canadense*		sensitive	
Shorthead Redhorse	*Moxostoma macrolepidotum*		secure	
Slimy Sculpin	*Cottus cognatus*		secure	
Spoonhead Sculpin	*Cottus ricei*	Not at risk	may be at risk	
Spottail Shiner	*Notropis hudsonius*		secure	
Trout Perch	*Percopsis omiscomaycus*		secure	
Walleye	*Stizostedion vitreum*		secure	
White Sucker	*Catostumus commersoni*		secure	
Yellow Perch	*Perca flavescens*		secure	

*This list identifies species that are confirmed to occur in the FMA by Weyerhaeuser sponsored research and monitoring programs (highlighted in green) as well as species that are likely to occur on the FMA as based on literature review, habitat associations and Alberta Fish and Wildlife sources.[1]

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[2]Committee on the Status of Endangered Wildlife in Canada

The Pembina River supports populations of sportfish such as northern pike, arctic grayling, burbot, mountain whitefish and walleye. Specifically, Dismal Creek, a tributary to the Pembina, supports what is likely Alberta's southernmost arctic grayling population. Data collection through the CFIP Program has revealed that grayling are specifically using a number of tributaries to Dismal Creek for spawning purposes.

The Brazeau Reservoir and Power Canal provide an important sport fishery area for northern pike, bull trout, brown trout, burbot and mountain whitefish. In addition, a number of ponds and small lakes have been stocked with rainbow trout to enhance recreational fishing opportunities within the FMA Area.

1.2.6 Water Resources

The highest priority in the overall management of the Eastern Slopes Region is placed on watershed management (A Policy for Resource Management of the Eastern Slopes Revised 1984). Consequently, the Integrated Resource Plans (IRPs) emphasize water and water resources for the FMA Area.

In the FMA, major river basins (either entirely or partially) include:

- The Athabasca River basin in the north portion of the FMA Area includes the Pembina River and Dismal Creek.
- The North Saskatchewan River basin includes the Nordegg, Baptiste, Brazeau, and Blackstone Rivers and numerous small permanent creeks that include Wolf (locally known as Lodgepole CTP), Wapiabi, Sand, Rundell, Chambers, and Sturrock creeks.
- The South Saskatchewan River basin on the east side of the FMA. Medicine Lake and Medicine River flow into the Red Deer River and eventually into the South Saskatchewan River.

1.2.6.1 Delineation of Watersheds

In the spring of 2004, Weyerhaeuser contracted GISmo Solutions Ltd. of Edmonton to create watershed layers for SYU R12.Utilizing the new Provincial Streams layer, GISmo tagged all watercourses with a Strahler order number, starting at the headwaters. Watersheds were then created using streams at the 4th order, in effect creating 4th order watersheds (Map 1-10). Subsequently, all 4th order watersheds were given unique names. The watershed name, where possible, was linked to the predominate stream (i.e. Rat East) for the watershed. When this was not the case, names of historical or local significance were applied. The project was completed in June of 2004 (Watershed and Streams Classification – Edson/Drayton Valley, (Appendix 1-2). The completed coverage defining watershed boundaries transcended the FMA boundaries as a general rule. As a result, some watersheds are only partially within either FMA (Table 1-32).

Table 1-32 Fourth-Order Watersheds Overlapping R12

Watershed Name	Full Watershed Area (ha)	Internal Watershed Area (ha)	External Watershed Area (ha)	Percent of Watershed within the Gross FMA Area	Percent of Watershed outside the Gross FMA Area
Baptiste	62,415	47,646	14,768	76.34%	23.66%
Big Beaver	8,574	4,390	4,184	51.20%	48.80%
Blackstone	11,378	10,762	616	94.59%	5.41%
Blanchard	4,216	4,167	49	98.84%	1.16%
Brazeau	22,167	22,166	2	99.99%	0.01%
Brewster	17,039	6,617	10,422	38.83%	61.17%
Broken Arm	21,976	3,398	18,578	15.46%	84.54%
Brown	7,062	1,230	5,831	17.42%	82.58%
Chambers	15,790	11,408	4,382	72.25%	27.75%
Chief	4,376	2,029	2,348	46.36%	53.64%
Colt	1,654	1,652	2	99.87%	0.13%
Dismal	43,648	18,337	25,312	42.01%	57.99%
East Lobstic	5,847	408	5,439	6.97%	93.03%
East Pembina	84,394	12,078	72,316	14.31%	85.69%
Elk	32,500	4,282	28,218	13.18%	86.82%
Goff	1,835	8	1,828	0.42%	99.58%
Gonika	3,353	23	3,330	0.69%	99.31%
Grey Owl	5,358	3,931	1,427	73.37%	26.63%
Hansen	1,410	1,407	4	99.74%	0.26%
Haven	6,709	71	6,638	1.06%	98.94%
Horseshoe	7,605	1,372	6,233	18.04%	81.96%
Lookout	5,776	5,576	199	96.55%	3.45%
Lower Brown	11,428	8	11,420	0.07%	99.93%
Lower Chungo	8,256	8	8,249	0.09%	99.91%
Marshybank	1,981	1,072	909	54.10%	45.90%
McCormick	2,141	4	2,137	0.18%	99.82%
Middle Colt	1,891	4	1,887	0.22%	99.78%
Mink	6,336	1,864	4,472	29.42%	70.58%
Negraiff	71,774	30,907	40,868	43.06%	56.94%
Nordegg	64,095	53,323	10,772	83.19%	16.81%
North Saskatchewan	110,516	65,516	45,000	59.28%	40.72%
Opabin	5,847	13	5,834	0.22%	99.78%
Open	18,704	7,040	11,663	37.64%	62.36%
Pembina	81,869	8,583	73,286	10.48%	89.52%
Penti	5,089	4,104	985	80.65%	19.35%
Rapid	9,406	5,490	3,916	58.37%	41.63%
Rehn	2,159	2,159	0	100.00%	0.00%
Rundell	24,591	18,160	6,432	73.85%	26.15%
Ryhannan	1,364	1,188	176	87.08%	12.92%
Sand	46,175	27,857	18,318	60.33%	39.67%
Shankland	2,616	17	2,600	0.63%	99.37%
Shunda	28,804	17	28,786	0.06%	99.94%

Watershed Name	Full Watershed Area (ha)	Internal[1] Watershed Area (ha)	External[2] Watershed Area (ha)	Percent of Watershed[3] within the Gross FMA Area	Percent of Watershed outside the Gross FMA Area
Slater	36,286	9,948	26,337	27.42%	72.58%
Smith	4,263	34	4,229	0.80%	99.20%
South Cungo	1,967	7	1,960	0.37%	99.63%
Stevens	4,948	4,939	9	99.81%	0.19%
Sturrock	5,775	5,520	255	95.59%	4.41%
Sutherland	11,363	1,145	10,219	10.07%	89.93%
Tallpine	21,347	21,255	92	99.57%	0.43%
Upper Blackstone	6,506	24	6,482	0.37%	99.63%
Upper Chungo	6,787	7	6,779	0.11%	99.89%
Upper Colt	5,086	0	5,086	0.00%	100.00%
Upper Saskatchewan	51,347	1	51,346	0.00%	100.00%
Wapiabi	10,487	5,974	4,514	56.96%	43.04%
Wawa	9,740	9,665	75	99.23%	0.77%
Welch	17,906	865	17,041	4.83%	95.17%
Wilson	22,234	8,770	13,464	39.44%	60.56%
Wolf North	17,400	808	16,592	4.64%	95.36%
Wolf South	41,704	31,317	10,387	75.09%	24.91%

[1]Area of watershed within the boundaries of the SYU
[2]Area of watershed outside of the boundaries of the SYU
[3]Watersheds with >90% outside SYU, by area, will not be analyzed for harvesting impacts

1.2.6.2 Hydrology

The Forest Management Agreement identifies PNT800942 for future water resource development. This PNT is around the Brazeau Reservoir and is for possible future expansion of the Reservoir (Figure 1-16).

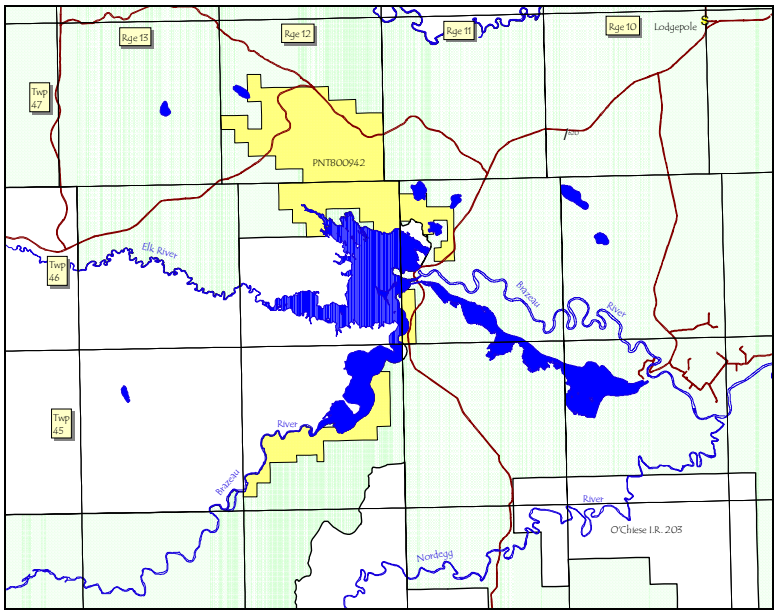


Figure 1-16 Proposed Expansion Area of the Brazeau Reservoir

1.2.7 Unique Ecological and Historic Resources

1.2.7.1 Natural Areas and Ecological Reserves

The Rocky - North Saskatchewan IRP identified an ecologically significant area immediately west of the O'Chiese Indian Reserve (See Figure 1-17). The area is representative of the forested upland terrain of the eastern foothills. This area has now been defined and placed under an Order in Council as the O'Chiese Natural Area (Twp 44 Rge 10 W5M). Weyerhaeuser has agreed to act as volunteer steward for the area. The Company's duties will be to observe, record and report any activities within the Natural Area and to assist the Province in management and promotion.

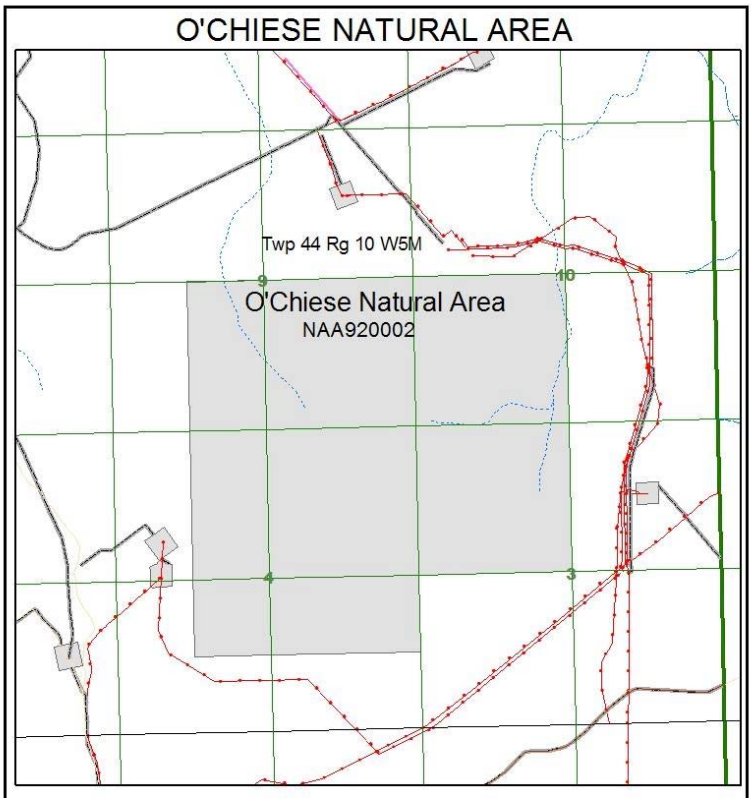


Figure 1-17 O'Chiese Natural Area

Likewise, the Coal Branch IRP notes the creation of the Marshybank Ecological Reserve established in July 1987 by Order in Council. "The Marshybank Reserve is split into two portions by a half mile strip of land that provides for future access to other resources."[25]

All these ecologically significant and protected areas have been excluded from the eligible landbase for the FMA Area. The western portion of the Reserve was excluded from the FMA in 1999, with the understanding that the smaller eastern portion would eventually be returned to the FMA.

[25] Coal Branch Sub-Regional Integrated Resource Plan 1990

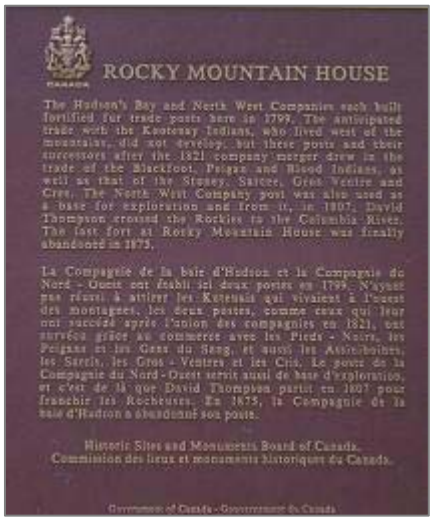
Map 1-10 Fourth-Order Watersheds

1.2.7.2 Brazeau Canyon Wildland Provincial Park

Brazeau Canyon Wildland Provincial Park (50.39 km2) preserves a portion of the valley of the Brazeau River where it leaves Jasper National Park west of Rocky Mountain House. Uplands north of the deeply incised valley include small kames, eskers and lakes. South of the river a diversity of mineral and organic wetlands with tufa deposits and marl pools are preserved. The wildland has high plant community diversity and rare plants have been noted.[26]

1.2.7.3 Historical Resources Predictive Model

On November 14, 2000, the Assistant Deputy Minister of Alberta Community Development (ACD), Dr. W. J. Byrne, directed all forest companies to develop strategies to comply with the Historical Resources Act. (Letter from Les Hunt, ACD, to AFPA, November 7, 2003). The Act protects and regulates palaeontologic, pre-historic and historic sites.



Following receipt of this letter, Weyerhaeuser, beginning in the spring of 2001, began actively formulating a company-wide strategy to deal with the Historical Resources Act. Other forest companies (Sundance Forest Industries, Ainsworth Lumber, and Alberta Plywood) were approached to participate in the development of a Regional Management System regarding these resources.

The final project encompassed two stages:

1. Overview information comprising currently known resources and a GIS based predictive model for individual FMAs.
2. A management system for historical resources.

Stage 1: Known sites and Predictive Model [27]

This stage reviewed all known sites (35 in 2002) within SYU R12 with the exception of the two portions of old R1. These known sites were used to calibrate the GIS predictive model to gain a level of confidence for applicability. The end result was a terrain (e.g. Degree of slope, proximity to flowing water) based model "to predict the location of pre-contact archeological sites" (pg 56, Historical Resource Management System, Golder Associates. 2002). The model predicts the likelihood of resources being present in three categories: high, moderate and low. The model will be re-calibrated at the end of three years based on three years of field surveys.

[26] http://www.cd.gov.ab.ca/preserving/parks/sp_places/regional.asp
[27] Weyerhaeuser Drayton Valley FMA Historical Resources Predictive Model. Nov 2002. Golder Associates. pp 101.

The model classified the FMA with regard to pre-contact historical archeological resources as follows: 8.5% classified as having high potential, 25.3% classified as having moderate potential, and 66.2% classified as having a low potential.

Stage 2: Management System[28]

The management responses expected are as follows:

- Areas of high potential: avoidance or referral to a historical resource consultant (archeologist) who will review the sites pre-activity during frost-free and snow-free conditions using aerial photography to direct the appropriate field inspections.
- Areas of moderate potential: avoidance; or referral to historical resource consultant for post-activity review during frost-free, snow-free conditions.

Map 1-11 shows Archeological Potential results.

1.2.7.4 Prime Protection

The Nordegg-Red Deer River and Coal Branch IRPs have identified areas of "Prime Protection" as defined by A Policy for Resource Management of the Eastern Slopes Revised 1984. The intent of the prime protection zone is to preserve environmentally sensitive terrain and valuable ecological and aesthetic resources. Regional objectives that are considered compatible with the intent of this zone include watershed, fisheries and wildlife management, and extensive recreational activities such as hunting, trail use (non-motorized) and primitive camping.[29] Timber harvesting is not considered a compatible activity. The Eastern Slopes Policy does, however, recognize the need to consider, under strict operating guidelines, essential management programs which may include activities such as wildlife habitat improvement, fire control, and timber sanitation cutting to protect merchantable timber in other zones.

1.2.8 Anthropogenic Uses

1.2.8.1 Aboriginals

Sunchild and O'Chiese First Nations[30]

The original Ojibwa (also known as Chippewa, Saulteau, Sato or Bungee) were from northwestern Ontario. They migrated westward as they trapped for European Fur Traders in the 18th and 19 century. In the 1880's one group moved through the Rocky Mountain House area into the headwaters of the North Saskatchewan River. They were joined by members of the Cree who had originated from the Cypress Hills under the leadership of Sun Child.

[28] Historical Resources Management System. Dec. 1992. Golder Associates, 85 pp
[29] A Policy for Resource Management of the Eastern Slopes, Revised 1984
[30] Indian Traibes of Alberta. 1997. Dempsey, Hugh A. pp 108

In the 1920's, the original Ojibwa were led by Jim O'Chiese. In 1930, the control of Crown land was transferred from Canada to the Province of Alberta. The Department of Indian Affairs set up two reserves northwest of Rocky Mountain House. In 1994, the Sunchild Cree settled on the Sunchild Reserve. Later on, a group led by John Strawberry broke away from the O'Chiese led band and settled on the O'Chiese Reserve.

The Métis Nation of Alberta and the History & Culture of the Métis People

The Métis people are recognized as one of Canada's three Aboriginal peoples in the Canadian Constitution. The Métis are the descendants of the children of First Nations people and the early European adventurers, explorers and fur-traders who came to Canada in the 17th and 18th centuries.

The Region III Council, based in Calgary, and Zone IV Council located in Edmonton represent the Métis people living within Weyerhaeuser's Drayton Valley Defined Forest Area. There are no Métis settlements within the Unit.

In township 42 range 8 along the Baptiste River there is a Provincial Historic Resource, which is managed by the Métis Nation of Alberta Association (DHR - 010006). The Baptiste River historical site was occupied by an extended family of Métis who lived in at least four separate dwellings between c. 1930-1935.

1.2.8.2 Oil and Gas

One of the most prominent land uses is oil and gas development. The unit overlaps, in whole or in part, six defined oil and gas fields. Development is intensive in some portions of the area and can have a significant impact on forest management, as well as contributing to the cumulative impact on other resources. Continuing development for oil and gas resources is expected.

As of the spring of 2004, there were approximately 2300 wellsites either in production or suspended, and approximately 370 other industrial sites (battery, compressors, valve sites, etc.). In addition, the unit is intersected by a large number of roads, powerlines, pipelines and seismic exploratory lines that extend over 17,000 km, for an average of 4 km/km2. Roads amount to over 2100 km; powerlines, pipelines and other industrial linear disturbances amount to over 4600 km; and seismic lines (wider than 6 m) exceeded 10,500 km.

As shown in Table 1-33 and Table 1-34, the intensity of industrial development varies significantly across Landscape Management Units. The variation is graphically described in Figure 1-18 and visually on Map 1-12.

Table 1-33 Oil and Gas Developments to Spring of 2004

LMU	Wellsites (ha)	Public Facilities (ha)	Other Industrial Sites (ha)	Total
Baptiste	845.9	524.5	3,125.1	4,495.5
Blackstone	26.4	0.0	225.8	252.2
Elk River	484.5	0.0	941.4	1,425.9
Marshy Bank	23.9	0.0	53.8	77.7
Medicine Lake	82.8	0.0	475.2	558.0
Nordegg River	161.7	0.0	1,112.2	1,273.9
O'Chiese	287.1	0.0	5,869.8	6,156.8
Sand Creek	667.8	0.0	1,350.8	2,018.5
Tall Pine	404.1	0.0	953.6	1,357.7
Willesden Green	625.3	148.7	1,129.8	1,903.8
Total	**3609.5**	**673.2**	**15,237.5**	**19,520.0**

Table 1-34 Linear Disturbance to Spring of 2004

LMU	Roads* (km)	Cutlines (km)	Pipelines (km)	Powerlines (km)	Total (km)	Total (km/km2)
Baptiste	56.9	1561.7	126.4	1.3	1746.3	2.33
Blackstone	8.4	484.2	7.2	0.0	499.7	1.27
Elk River	4.5	2092.6	42.1	0.0	2139.2	4.19
Marshy Bank	4.8	241.7	2.0	0.0	248.5	1.41
Medicine Lake	195.0	660.0	9.8	0.0	864.8	4.17
Nordegg River	116.4	1124.0	75.0	1.0	1316.3	1.85
O'Chiese	137.3	1512.0	161.1	8.7	1819.1	2.48
Sand Creek	321.3	1602.1	45.9	1.0	1970.3	4.26
Tall Pine	17.1	1155.6	24.9	0.2	1197.8	2.98
Willesden Green	61.9	1401.5	44.7	0.0	1508.2	2.70
Total	**923.6**	**11835.4**	**539.1**	**12.2**	**13310.2**	**2.71**

* Includes roads within landuse disposition

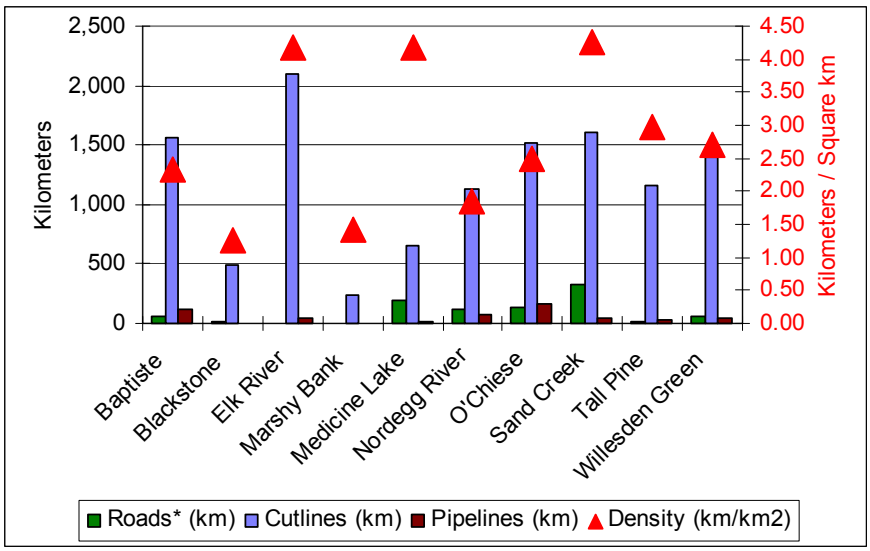


Figure 1-18 Linear Disturbance to Spring of 2004

Map 1-11 Archeological Potential

Map 1-12 Industrial Landuse

1.2.8.3 Grazing

Grazing dispositions encompass approximately 14,000 hectares. Grazing Leases, Licenses, Permits and Allotments are included in the SYU Area landbase. Grazing dispositions are concentrated primarily in the eastern portion of the unit. Grazing dispositions are eligible for harvesting through Quota allocations. (Map 1-13)

1.2.8.4 Private Land

Private land is found primarily in the east and south, adjacent to the agriculturally developed land. There are over 275 parcels of land for a total area of approximately 7200 hectares. Table 1-35 describes the distribution of patent land across the unit.

Table 1-35 Patent Land in the FMA Area by LMU

LMU	Area (ha)
Baptiste	3,902.6
Blackstone	0.0
Elk River	0.0
Marshybank	0.0
Medicine Lake	324.6
Nordegg River	2.1
O'Chiese	120.3
Sand Creek	1,574.0
Tall Pine	142.1
Willesden Green	1,156.2
Total	**7,222.0**

1.2.8.5 Trapping

The entire unit is overlapped by registered trap lines, 42 of which are contained in whole or in part within the FMA Area (see Registered Fur Management Areas Map (Map 1-14)). This data set is based on Fish and Wildlife Division report No. LFWE0006 "Fur Trapping System-Licensed Trappers by Trapping Area," which details ownership by primary and secondary holders.

1.2.8.6 Recreation and Tourism

The Integrated Resource Plans, the M.D. Brazeau report on the Brazeau Reservoir Region Tourism and Recreation Potential, and Provincial base maps are the sources of information on which Weyerhaeuser has relied to identify recreation areas. There are no major recreation plans or developments other than those identified in the IRPs.

A synopsis of the IRP recreational resources assessment as it pertains to forest management is as follows:

- Overall recreational use and potential is moderate to low due to relatively poorer access and because areas outside the FMA are in greater demand. It should be noted that the Brazeau Road from Lodgepole to the Brazeau Reservoir has been upgraded since the IRP was done.
- Areas with high recreational use and potential include the Brazeau Reservoir, Medicine
- Lake, North Saskatchewan River, staging areas at the Blackstone and Wapiabi gaps, the Forestry Trunk Road, the Change road and Highway 11 corridor for water based activities, camping facilities and scenic resources.
- A designated vehicle route pilot project for recreational vehicles was proposed for the Brazeau-Pembina Sub-Region but has not been carried out.
- Public Lands and Forests Division have prepared a self-guided vehicle tour of the forest area southwest of Drayton Valley – the Brazeau Natural Resources Tour.

1.2.8.6.1 Wapiabi Recreation Area

Wapiabi Recreation Area (40.33 km2) includes the valley of the Wapiabi River from Wapiabi Gap east to the Blackstone River. The valley is an important wildlife movement corridor and is used by moose, elk, wolf and grizzly bear. Bull trout live in the river. Road access along the river has resulted in the site northwest of Nordegg, being popular for a variety of recreation activities. [31]

1.2.8.6.2 Campgrounds

The following campgrounds are located within the vicinity of the FMA.

- Brazeau Reservoir Recreation Area including Canal group area – built in 1979 by the Alberta Forest Service (AFS) under DRS 790061. Converted to a Provincial Recreation Area (PRA) in 1996 and administered by Alberta Community Development.
- Brazeau Reservoir Group Camp – built in 1993 by Lands and Forest Service (LFS). Weyerhaeuser was the main contributor while LFS staff built it. It is now part of the PRA.
- West Canal Camp – built by the AFS in 1979 under DRS 790061. Converted to PRA in 1996.
- East Canal Group Camp– built by the AFS in 1979 under DRS 790061. Converted to PRA in 1996.

These campgrounds are now run collectively as Camp Brazeau. All of the camping areas are adjacent to either the Brazeau Reservoir or the Brazeau Canal.

[31] http://www.cd.gov.ab.ca/perserving/parks/sp_places/regional .asp

Map 1-13 Grazing Dispositions

Map 1-14 Registered Fur Management Areas

There are three other maintained campgrounds in the FMA: Chambers Creek, Medicine Lake, and Blackstone River.

1.2.8.6.3 Day Use Areas

There is a small day use site called Jack Knife Springs, in township 46 range 9, which encompasses a tufa (PNT). Jack Knife Springs Picnic Area is maintained and has good access off the Power House Road.

1.2.8.6.4 Parks

Jasper National Park (JNP) is found west of the SYU. It is adjacent to the southwest corner of the Marshybank LMU.

Crimson Lake Provincial Park is located in the southeast corner of the Baptiste LMU. It is surrounded on three sides by the SYU, while the eastern boundary is adjacent to the White Area. Crimson Lake Provincial Park is approximately 6 kilometers from the town of Rocky Mountain House. The Park covers about 32 square kilometers. A total of 170 camping sites are available to the public.

1.2.8.6.5 Tourism Operations and Recreational Stakeholders

There are a number of organizations or businesses that operate upon or in the vicinity of the FMA. These include:

- Brazeau ATV Club
- Centre for Outdoor Education
- Cheechako Survival Training
- Frontier Lodge
- Hostelling International – Northern Alberta
- Husky Wilderness Adventures (dog sled tours)
- Ice Haven Expeditions (dog sled tours)
- Rock and Water Adventure
- South of 60 Wilderness Associated Adventurers

1.2.8.6.6 Recreational Leases

There are two Recreational Leases within the FMA Area:

1. REC 2818, which is located west of Rocky Mountain House and is a gun club operated by the Town of Rocky Mountain House.
2. REC 810013, which is the Open Creek Dam, located south of highway 53 in the Medicine Lake LMU and is operated by the Rimbey Fish and Game Association.

1.2.8.7 Timber Harvesting

Logging and saw milling operations were in the area as early as 1900. Much of this early activity was restricted to forested areas that were easily accessible along major watercourses. These same watercourses were also used as the main transportation method for getting logs to the sawmill. The last river run on the North Saskatchewan occurred in 1926.

In the 1960s, the boom in oil exploration and subsequent development meant many of the previously inaccessible areas became accessible to the forest industry. This decade also saw the introduction of a timber quota system that provided long-term security of timber supply as well as legal responsibility for prompt reforestation of cut over areas.

The following tables (Table 1-36 and Table 1-37) represent the recorded harvesting that has occurred. The older harvest areas, going back to the early 1900s, had not been recorded and have consequently been interpreted into the forest inventory as per AVI version 2.1 standards. Of the over 2,000 cutovers identified by Weyerhaeuser from inventory updates and enhancements, most have been associated with a silviculture opening number. Weyerhaeuser will continue to update the logging history to ensure accurate and complete records for subsequent Plan submissions.

Pre 91 blocks refers to the blocks harvested prior to March 1, 1991, as per the Timber Management Regulation, and also includes blocks harvested prior to the establishment of the timber quota system in 1966. Thirty percent of the Pre 91 area was harvested and reforested as deciduous blocks.

Post 91 FMA includes all blocks harvested under authority of FMA8500023 since the transition date of March 1, 1991. Weyerhaeuser has the legal responsibility on all of these blocks to meet or surpass the requirements for stocking, species composition, performance and free to grow requirements where required (conifer blocks).

Table 1-36 Timber Harvesting by LMU

LMU	Number of Blocks	Area (ha.)
Baptiste	368	4,473.9
Blackstone	14	368.8
Elk River	249	4,751.5
Marshybank	23	662.8
Medicine Lake	2	74.2
Nordegg River	319	4,427.7
O'Chiese	342	4,763.9
Sand Creek	260	5,193.6
Tall Pine	221	4,237.6
Willesden Green	220	3,864.6

Table 1-37 Timber harvesting by Reforestation Transition Dates by LMU (Hectares)

LMU	Pre 91	Post 91 FMA*	91-95 Quota*	Post 95 Quota*
Baptiste	2,548	2,921	0	0
Blackstone	359	0	0	0
Elk River	3,774	370	407	270
Marshy Bank	636	0	0	0
Medicine Lake	50	32	0	0
Nordegg River	3,349	645	1,344	1,570
O'Chiese	3,617	2,834	1,475	1,213
Sand Creek	3,571	1,811	98	66
Tall Pine	3,489	1,084	0	0
Willesden Green	1,965	1,951	0	0
Grand Total	**23,360**	**11,647**	**3,324**	**3,119**

* A split between FMA and Quota determined using available ARIS data

91 – 95 Quota blocks are all blocks harvested on the FMA Area under authority of a timber quota, CTP, or LTP (e.g., Tall Pine Timber's CTQ R010004) between March 1, 1991 and April 30, 1995. Reforestation of all these blocks up to the establishment survey is the responsibility of either the forest product company or the Public Lands and Forests Division. Responsibility for meeting the free-to-grow requirements on the conifer landbase belongs to Public Lands and Forests Division.

Post 95 Quota blocks are all blocks harvested on the FMA Area under authority of a timber quota, CTP or LTP after April 30, 1995. The reforestation responsibility for the establishment and free-to-grow requirement, where necessary, rests solely with the company that harvested the cutover. The exceptions to this are the Community Timber Program and Local Timber Permits that remain the responsibility of Public Lands and Forests Division.

1.2.9 Wood Manufacturing Facilities

1.2.9.1 Weyerhaeuser Company Limited

Weyerhaeuser Company Limited's processing facilities at Drayton Valley are an Oriented Strand Board (OSB) plant and a dimensional lumber sawmill-planer complex. Both facilities are located within the town limits of Drayton Valley along highway 22 (sections 5 and 8, township 49, range 7, west of the 5th meridian). The OSB plant and sawmill-planer complex share common forestlands, a weigh scale and log yard.

OSB Plant

The OSB plant started up in March 1987, and currently employs 187 full time people for 12 months on a four on / four off shift schedule. The plant's annual production capacity is 402,000,000 square feet of board on a 3/8" thickness basis: enough to build approximately 30,000 homes. About 60% of the production is used in the secondary manufacture of structural I beams.

Table 1-38 lists the tree species used by the OSB plant; aspen comprises 75% of the total volume and three other species make up the rest. Wood for the OSB plant is hauled to Drayton Valley as shortwood with most of it bucked to lengths of 2.6 metres. Logs of good quality are essential to obtain the high board quality that is associated with Weyerhaeuser's Sturdi-wood and Struc-one. After the bark is removed, a series of specially designed knives (called a waferizer) transforms the logs into engineered strands of precise size and thickness. For strength, the grain of each strand matches the original grain of the log. The strands are dried in the three-pass dryer system. The dried strands are then sent through a series of cyclones and screens to remove unwanted fine particles. All unwanted fine particles generated by the dryers are sent to an electrified filter bed and baghouse to reduce the amount of fine particulate released to the atmosphere. In turn the collected fine particulate is sent to a thermal energy unit for incineration and heat recovery (the volcano). A liquid or powder phenolic and/or a liquid

methyl di-isocyanate resin, applied in blenders, coats each strand to provide uniform bonding and resistance to moisture. The strands are oriented in parallel and perpendicular layers to maximize panel strength and stability before going to a press. The press is computer controlled to ensure that each panel is 100% uniform and consistent, and precisely engineered for its end use. Press emissions are captured in a cupola at roof level and exhausted through a 45 metre stack for improved ambient air dispersion. There are two sawlines: the grade line with a four-foot wide board sander, and a specialty line with an eight-foot wide board sander. Each sander is connected to a baghouse filter that collects fine sawdust. This effectively removes the material from the exhaust stream and it is then incinerated for heat recovery. With the combination of the sawlines, the plant manufactures OSB panels from ¼ inch to 1¼ inch thick, and panel sizes of 2 by 3 feet to 8 by 24 feet with sanded and tongue-and-groove board available. A quality control lab ensures that the OSB panels meet or exceed plywood quality ratings thickness for thickness.

Table 1-38 Species Utilized by the Drayton Valley OSB Plant (2004)

Species	% of Wood Supply
Aspen	75
Balsam Poplar	20
Birch	2.5
Conifer	2.5

The OSB plant utilizes hog fuel from the de-barkers and slasher decks to provide energy for the volcano. The volcano provides heat, by incineration, to the building, log ponds, wax tanks, resin tanks and the press. Wood fuel from the sawlines is used to fire the natural gas assisted dryers. Ninety-eight percent of the heat required for the dryers is provided from the burning of the wood fuel.

All off-grade OSB is sent to Sawn Wood Products in Drayton Valley for the manufacture of dunnage, which is placed under each bundle of OSB. The dunnage is strapped to each bundled, effectively lifting the bundle off the ground for forklift access and protection against moisture. Dunnage made from OSB has replaced traditional 2 by 4 lumber.

Sawmill-Planer Complex

The sawmill-planer complex started up in December 1987 and has 165 full time employees. The sawmill's annual capacity is 157,000,000 board feet: enough to build approximately 42,000 homes. The sawmill-planer complex also produces approximately 75,000 dry tonnes of chips. In 1997-98 a planer shavings bin was installed to remove 10,000 tonnes of material from the waste process for sale to a Medium Density Fiber Board plant in Whitecourt, Alberta.

The sawmill complex uses chip-and-saw technology on both the small log line and the large log line. An edging optimizer increases the mill's production and utilization. A 45-bin computer-controlled J-bar sorter is used for rough, green lumber. The planer mill

complex dry kilns 100% of the lumber manufactured, and over 98% of the lumber is planed. The planed lumber is sorted with a 22-bin computer controlled J-bar sorter. With the chip-and-saw technology and the edging optimizer, the sawmill manufactures finished lumber (appearance J grade and dimensional) from 1 by 4 inches to 2 by 12 inches and from 8 to 24 feet long. The sawmill-planer complex utilizes spruce (mostly white, but some black and Engelmann), lodgepole pine and a small to insignificant portion of balsam fir, larch and alpine fir.

In 1999 the Planer Mill started up a "dry trim block recovery system" to capture blocks 12"-23" in length. It produces both a rip grade and "2 & better" block, which are sold to a secondary manufacturer for door and trim production.

The sawmill utilizes hog fuel from the cut-off saw and the de-barker to provide energy to the volcano, which generates heat for the building and the dry kilns.

Log Yard
The shared log yard stores a variety of tree species and log lengths that created some natural wood leachate issues for a nearby drainage called West Park Creek. To reduce the impact of the release of these natural leachates to the surrounding environment, a surface run-off management system has been built to collect and store all site run-off. The collected run-off is then pumped to a constructed wetland where the toxicity of the leachate is reduced using natural wetland vegetation. Once the leachate toxicity has been reduced, the water is released into West Park Creek under approval of Alberta Sustainable Resource Development.

Power Plant
The Drayton Valley Power Plant started operations on April 11, 1996. Under a 21-year agreement, Weyerhaeuser will provide 180,000 green tonnes per year (90,000 oven-dry tonnes) of hog fuel from the OSB Plant and Sawmill operations. This amount of hog fuel will generate 12 megawatts of power. Of this, 10.5 megawatts of utility grade power are sold to the local power grid at an established rate, and the remaining 1.5 megawatts are used by the power plant to operate its internal equipment.

Using a waste transfer system at either the OSB Mill or Sawmill, two company-owned 19.1 metre live floor vans transport the material to a power plant scale for measurement. After each load is weighed, the raw material is placed in a grinder for immediate processing or into a temporary raw pile for future use.

At present there is a surplus of hog fuel to operate the power plant, so this excess is moved into several different programs, including composting, mulching, oil and gas lease reclamation, road reclamation, decorative bark, incineration and public events. This has avoided direct land filling of wood debris that may still have some secondary manufacturing benefit.

1.2.9.2 Tall Pine Timber Co. Ltd.

Since 1958, Tall Pine Timber Co. Ltd. has operated a sawmill-planer complex, located along secondary highway 620 (section 28, township 46, range 11 west of the 5th meridian) southwest of Lodgepole. The sawmill's current annual capacity is 10,000,000

board feet and 50,000 dry tonnes of chips. Tall Pine Timber Co. Ltd. employs 15 full time staff and has five contract positions.

The sawmill has two log lines. The small log line utilizes chip-and-saw technology, and has a capacity of up to 42 centimetres. The large log line is made up of a 76-centimetre de-barker, QM head rig, and 60-centimetre sash gang saw. All green lumber is sorted with an edge sorter. The mill uses spruce, pine and fir in the production of imperial and metric sized dimensional dressed and rough lumber, and timbers up to 5.33 metres long. The sawmill waste is burned on site in the teepee burner.

1.2.9.3 Hansen Forest Products

In 1986, Hansen Forest Products established a small sawmill near Eckville, Alberta. In 1996, a kiln was added to the facility. Volume from Quota CTQ R120001 provides conifer to the mill.

The mill produces dimensional lumber as well as decking and facia.

1.2.9.4 Sundance Forest Industries

Located west of Edson. The plant utilizes 100% lodgepole pine, producing kiln-dried lumber focusing on Japan's semi-finished and finished markets, as well as North American niche markets. The sawmill produces over 100 million board feet annually and employs in excess of 150 people. Sundance also supplies some deciduous timber to both Edson and Drayton Valley OSB mills. (Source: Sundance Forest Industries website)

1.2.9.5 Sundre Forest Products (formally known as Sunpine Forest Products)– Rocky Mountain House

Sundre Forest Products Ltd. (West Fraser): Sundre operates facilities in two locations: 1) Sundre, with sawmill, wood treating and post manufacturing facilities, and 2) Strachan, with a continuous laminate veneer lumber plant. Both facilities employ in excess of 500 people.

1.2.9.6 Small Sawmills

There are a number of small, locally owned sawmills that are located on private property that produce dimensional lumber for personal use or local retail.

2 WEYERHAEUSER FOREST MANAGEMENT PHILOSOPHY AND THE PLANNING PROCESS

2.1 Corporate Hierarchy

Weyerhaeuser Company Limited is a wholly owned subsidiary of Weyerhaeuser Company of Tacoma, Washington.

Within the Weyerhaeuser organization, the Drayton Valley sawmill reports to Weyerhaeuser's Canadian Lumber Business, and the oriented strand board (OSB) mill reports to the Oriented Strand Board Business. Figure 2-1 shows the corporate hierarchy just described.

Pembina Forestlands in Drayton Valley and Edson serve both the sawmill and the OSB mills. The Pembina Forestlands manager reports to the Alberta Forestlands manager in Edmonton, and is responsible for the management of the Drayton Valley Forest Management Agreement (Appendix 2-1).

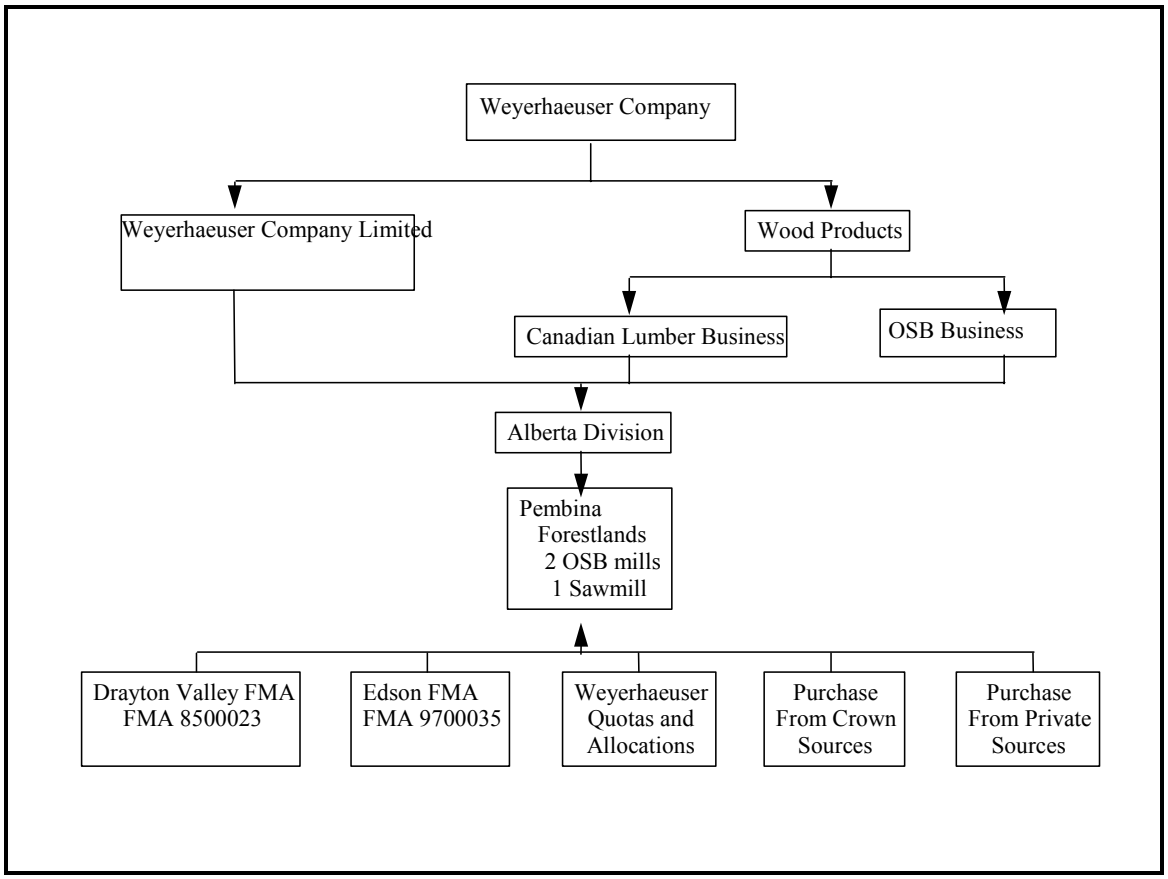


Figure 2-1 Weyerhaeuser Corporate Hierarchy

2.2 Management Philosophy

2.2.1 Weyerhaeuser Philosophy

Weyerhaeuser prides itself in being a progressive company, responding to the needs and desires of a very large constituency. This constituency is comprised of its parent company, Weyerhaeuser Company Limited, based in Tacoma, Washington, and its international shareholders, employees, suppliers and customers. The people of Canada and Alberta, and more particularly, the local Drayton Valley and District populations are also members of Weyerhaeuser's constituency.

Natural resources can also be defined as being constituents of Weyerhaeuser. Currently, all land where timber is harvested by Weyerhaeuser in the Province of Alberta is public land, held in trust for the betterment of the people of Alberta. These natural resources include air, soil, water, flora and fauna.

Weyerhaeuser's vision statement is:

"To be the best forest products business in the world

and a global leader among all industries".[32]

Associated with this vision is the mission to:

"Produce superior returns for shareholders by focusing on our customers and working safely to:

- ***grow and harvest trees***
- ***manufacture and sell forest products***
- ***build and sell homes".***[33]

Mindful of these statements, Weyerhaeuser's Environmental Policy is:

> ***"It is Weyerhaeuser's core policy that employees at all levels will work to ensure that we comply with applicable environmental laws, regulations and other requirements to which the company commits, and to continually improve our environmental performance wherever we do business.***

[32] Weyerhaeuser: Road map for success. 2004
[33] Weyerhaeuser. Road map for sustainability: Weyerhaeuser Company 2003. Citizenship and Environmental Report. Pp 96.

Employees are accountable for ensuring compliance with applicable laws and for managing and operating our businesses to conform to the company's goals of:

- ***Practicing sustainable forestry.***
- ***Reducing pollution.***
- ***Conserving natural resources through recycling and waste reduction.***

Expectations

In conducting our business, we are committed to:

- ***Understanding and responding to public-health and environmental impacts of our operations and our products.***
- ***Ensuring employees are trained and empowered to actively participate in the company's environmental management process.***
- ***Actively supporting environmental research and technological advancement and, where appropriate, adopting innovative practices and technology.***
- ***Promoting the development and adoption of environmental laws, policies and regulations that are balanced, are technologically sound, and use incentive-based approaches for improving environmental performance.***
- ***Managing forestlands for the sustainable production of raw materials while protecting water quality; fish and wildlife habitat; soil productivity; and cultural, historical and aesthetic values.***
- ***Continually improving our processes for reducing wastes and emissions to the environment.***
- ***Conserving energy and natural resources be maximizing recycling and byproduct reuse.***
- ***Using the company's environmental management systems to manage the environmental aspects of all timberlands and manufacturing operations.***
- ***Adopting internal standards for situations not adequately covered by law or regulation or where we believe more stringent measures are necessary to protect the environment."***[34]

[34] Roadmap for sustainability: Weyerhaeuser Company 2003. Citizenship and Environmental Report. Pp 96.

Weyerhaeuser's overall management approach is to practice sustainable forest management, which is defined as:

> ***"Weyerhaeuser manages its forests for the sustainable production of wood and wood products that meet our customers' needs. We are committed to independent certification of our forest management and to meet the principles and objectives of applicable forest certification systems. The elements of Weyerhaeuser's standard apply to company-owned and –managed lands worldwide.***
>
> - ***We harvest at sustainable rates over the long term.***
> - ***We encourage the use of nontimber products and services from the forest.***
> - ***We reforest promptly after harvesting by planting within the first available planting season, not to exceed 24 months, or by planned natural-regeneration methods within five years or as provided in an applicable license.***
> - ***We employ reliable processes in using forest chemicals to meet our silvicultural and environmental objectives in compliance with applicable laws, best management practices (BMPs), and label directions and in conformance with applicable certification standards.***
> - ***We protect soil stability and ensure long-term soil productivity by using equipment and practices appropriate to the soil, topography and weather to minimize erosion and harmful soil disturbance.***
> - ***We use forestry practices and technology to retain organic matter and soil nutrients.***
> - ***We maintain healthy forests and minimize losses caused by fire, insects and disease.***
> - ***We meet or exceed applicable water-quality laws and BMPs to protect water quality, water bodies and riparian areas.***
> - ***We protect water quality by practicing sound road construction and maintenance.***
> - ***We protect a diversity of habitats for wildlife and contribute to conservation of biological diversity through practices or programs that address habitat diversity and conservation of plants and animals at multiple scales in accordance with applicable certification programs or other locally accepted standards.***

- ***We protect threatened and endangered species and cooperate with government agencies to determine how our forestlands can contribute to their conservation.***
- ***We consider aesthetic values by identifying sensitive areas and adapting our practices accordingly and in conformance with applicable certification standards.***
- ***We identify special ecological, geologic, cultural and historical sites and manage them in a manner appropriate for their unique features.***
- ***We minimize waste in our harvesting".***[35]

2.2.2 Environmental Management System (EMS)

Weyerhaeuser has established and implemented an Environment Management System (EMS) as of 2002. The EMS outlines standards and procedures for its employees and contractors to achieve the requirements of the company's Environmental Core Policy. Employees are accountable for the company's environmental performance and compliance with environmental legal requirements. Forestlands' functions, activities and tasks are guided by clearly defined guidelines and operational controls.

2.2.3 CSA Certification

In 2002, Weyerhaeuser, using the Forest Advisory Committee (FAC) for public input, developed a Sustainable Forest Management Plan (SFMP) reflecting public values, objectives, indicators and targets to CSA standard Z809-96. The plan has undergone two reviews, in 2003 and 2004.

In 2005, the SFMP will be reviewed and updated to the newer CSA standard Z809-02, again using the FAC to provide input into the plan.

Generally the SFMP takes direction from the DFMP. However, in the future, the SFMP will influence revisions to the DFMP and associated ground rules.

2.3 Planning Process

The scope of our planning for the management of forest resources on the Drayton Valley FMA entails forest harvesting and renewal activities and their integration with other forest values.

Consistent with this scope Weyerhaeuser intends to continue to plan for and practice sustainable forest management that strikes a balance between ecological, societal, and economic values. Identifying the desired balance of values and adopting an appropriate management strategy to deliver these values is the purpose of the management planning process.

[35] Roadmap for sustainability: Weyerhaeuser Company 2003. Citizenship and Environmental Report. Pp 96.

2.3.1 Ecological

Ecological values have been integrated into the planning process through ecological sustainability guidelines. These guidelines have been formulated with reference to the following principles:

1. Maintain landscape diversity and stand structure within the range of natural variability.

2. Conserve habitat for threatened and endangered plant and wildlife species.

3. Maintain the integrity of watersheds.[36]

These principles direct our perspective such that we take both a coarse filter approach (that is, managing the resource as ecosystems), and a fine filter approach (managing the resource for feature species). Weyerhaeuser's approach to maintaining biodiversity is outlined in Appendix 2-2.

2.3.2 Societal

Societal values have been integrated into the planning process through:

1. a public involvement process that ensured the public an opportunity to convey to Weyerhaeuser their issues and concerns on forest management, and

2. compliance with government legislation and policy.

2.3.3 Economic

Economic values have been integrated into the planning process by adopting a management strategy that recognizes economic needs of other stakeholders and provides an acceptable return to Weyerhaeuser shareholders.

[36] Range of natural variation broadly refers to “ecosystem dynamics over a time frame relevant to understanding the behavior of contemporary ecosystems”. “Range of variability” characterizes fluctuations in ecosystem conditions or processes over time. It can describe variations in diverse characteristics such as tree density, vertebrate population size, water temperature, frequency of disturbance, rate of change, etc. Determining range of variability will consider: 1) points in time prior to significant anthropogenic development (e.g. logging, fire suppression, etc.), 2) the dynamics of forest succession over time, and 3) societal expectations.

2.4 Management Approach– Adaptive Management

The Detailed Forest Management Plan, in conjunction with operational plans, has been designed to deliver on the goals and objectives developed from thorough consultation with other stakeholders. To aid in meeting these objectives, adaptive management will be used to implement the forest management plan. An adaptive management approach provides:

- confidence in management by identifying variances between forecasted conditions and actual conditions, in a timely manner,
- an opportunity to modify practices to ensure DFMP goals are attained,
- flexibility in how to adjust management to account for identified variances, and
- a better information base to meet future planning needs.

This is achieved through the application of the following elements:

- objective driven – the management plan is a series of activities that result in meeting a set of desired forest conditions and benefits,
- strategic and operational links – the strategic plan provides relevant direction for operational plans,
- monitoring – key result variables are monitored to assess accuracy of forecasts, and
- analysis and adjustment – plans are renewed based on the knowledge gained through analyzing the variance between forecast and actual responses.

Figure 2-2 represents the adaptive management approach.

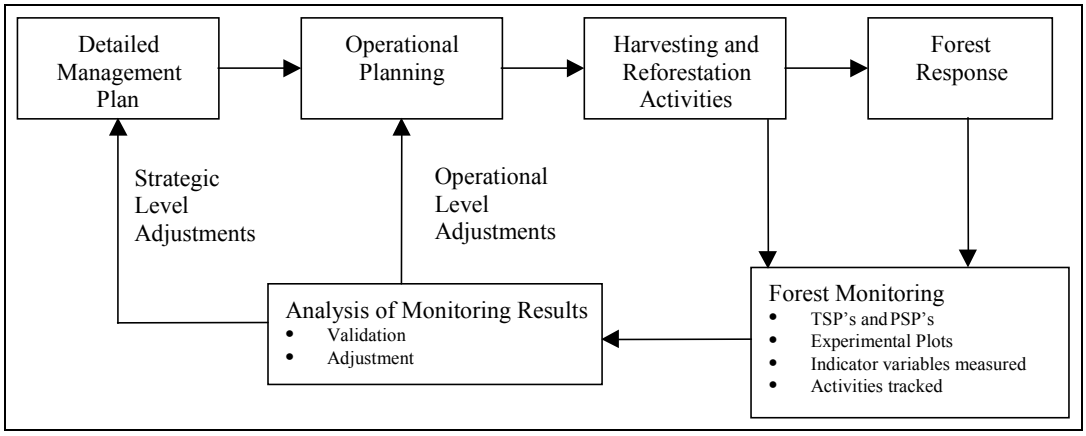


Figure 2-2 Adaptive Forest Management

3 RESOURCE MANAGEMENT GOALS

3.1 Previous Approved Plans Overlapping the Sustained Yield Unit

Since the establishment of the initial FMA8500023 in 1985, three plans have been completed specific to the FMA. They include the 1987 Preliminary Forest Management Plan, the 1992 Detailed Forest Management Plan, and the 1998 Preliminary Forest Management Plan for the expanded FMA area. As well, for those areas not covered by the FMA, Forest Management Unit plans were developed and approved by the Province.

3.1.1 1986 Forest Management (FMU) Plans

The over-riding objective of older Forest Management Unit (FMU) plans was the management of Alberta's timber land base to establish and maintain 'sustainable timber supplies' to meet present and future demand, while also ensuring resource integration to achieve maximum public benefit. FMU plan objectives were either Provincial or FMU specific in nature.

Provincial Objectives:

- To identify a timberland base for the planned harvest of coniferous and deciduous timber, recognizing the multiple resources of the forest,
- To ensure that the planned utilization of Alberta's forest resources is based on the most recent forest inventory provided by Phase III,
- To determine a level of harvest that recognizes forest industry and community needs as well as a high level of timber utilization,
- To renew existing quotas based on the revised Annual Allowable Cut (AAC) for a second 20-year term effective May 1st, 1986 according to the provisions of the Quota Policy and the Guidelines for the establishment of long term timber supply levels in Alberta (deleted in 1996, and replaced with 'Existing quota allocations are adjusted periodically to reflect the most recently approved FMA forest management plans'),
- To allocate and sequence the approved AAC, and
- To sustain and enhance timber yield through prompt reforestation, stand management, and afforestation of non-stocked lands

Specific Objectives of the R1 FMU (approved 1986, amended 1996)

1. To provide an optimum deciduous and coniferous AAC in order to meet the requirements of the FMA holder while meeting the requirements of the coniferous quota holder (amended in 1996 to read 'To provide an optimum deciduous and coniferous AAC in order to meet the FMA and quota holder requirements),

2. To schedule the harvesting of timber such that it addresses the intent of the Rocky-North Saskatchewan Integrated Resource Plan (deleted in 1996),

3. To provide miscellaneous timber use allowable cut for small individual operators,

4. To finalize the green/white area zone boundary so that further deletions for agriculture expansion will be minimal (deleted in 1996), and

5. New objective included in 1996, reads as 'to review this plan at the earliest by April 30, 1999 to account for changes to current forest land base, FMU boundaries, the implementation of the AVI, and sustainable forest management. The updates to the 1986 R1 plan will be in effect until the next Weyerhaeuser plan is prepared and approved'.

Specific Objectives of the R2 FMU (approved 1986, amended 1996)

1. To provide an optimum deciduous and coniferous AAC in order to meet the requirements of the FMA holder while meeting the requirements of the coniferous quota holder. The FMA holder is in the process of constructing an oriented strand board plant which will have a minimum capacity of 250 million square feet (3/8 inch basis). In addition, a sawmill-planer complex with a maximum capacity of 80 million board feet will be built in the near future. (amended in 1996 to read 'To provide an optimum deciduous and coniferous AAC in order to meet the FMA and quota holder requirements.')

2. To define a timber land base and to schedule the harvesting of timber such that it addresses the intent of the Rocky-North Saskatchewan Integrated Resource Plan.

3. To provide for future quota sales as requested by Pelican Spruce Mills Ltd and Revelstoke Co. Ltd. (deleted entirely in 1996).

4. To integrate deciduous and coniferous timber harvest operations within overlapping spheres; leading to a fuller utilization of the R2 AAC. (deleted in 1996)

5. To improve utilization of all quota operations to 15/11 cm utilization. (deleted entirely in 1996).

6. To provide an optimal coniferous AAC to meet the requirements of proposals submitted for the Brazeau TDA. (deleted entirely in 1996).

7. To develop intensive forest management strategies for both the coniferous and deciduous resource that will be implemented subject to provincial priorities, in future in FMU plans. These strategies will look at management problems arising from a shrinking land base and the impact on regenerated yields, resulting from mixedwood management and integrated harvest operations, and the shortened coniferous rotations.

8. To review this plan by April 39, 1991, to account for changes to the current forest land base and FMU boundaries. (Delete and replace with the following in 1996 'To review this plan at the earliest by April 30, 1999 to account for changes to current forest land base, FMU boundaries, the implementation of the Alberta Vegetation Inventory (AVI), and sustainable forest management. (There may be an unavoidable delay in the completion of the AVI inventory and so Sunpine's next plan submission might be delayed to as late as April 30, 2001. In any case, the updates to the 1986 R2 plan will be in effect until the next Sunpine plan is prepared and approved.'))

Specific Objectives of the R3 FMU (approved 1986, amended 1996)

1. To provide an optimum deciduous and coniferous AAC in order to meet the requirements of the FMA holder while meeting the requirements of the coniferous quota holder. The FMA holder is in the process of constructing an oriented strand board plant which will have a minimum capacity of 250 million square feet (3/8 inch basis) and a sawmill-planer complex with at least an annual capacity of 80 million foot board measure. (Amended in 1996 to read 'To provide an optimum deciduous and coniferous AAC in order to meet the FMA and quota holder requirements.')
2. To integrate deciduous and coniferous timber harvesting operations within overlapping spheres leading to a fuller utilization of the R3 AAC.
3. To provide an optimal coniferous AAC to meet the requirements of proposals submitted for the Brazeau TDA. (deleted entirely in 1996).
4. To recalculate the R3 FMU coniferous and deciduous AACs by April 30th, 1999 if proposed land base exchanges between FMUs E11, R3 and R4 are approved. This plan will evaluate the impact of the changes. (deleted entirely in 1996).
5. To develop intensive forest management strategies for both the coniferous and deciduous resource that will be implemented subject to provincial priorities, in future in FMU plans. These strategies will look at management problems arising from a shrinking land base and the impact on regenerated yields, resulting from mixedwood management and integrated harvest operations.
6. To revise this plan by April 30th, 1991 to account for changes to the current forest land base and FMU boundaries.

Specific Objectives of the R4 FMU (approved 1986, amended 1996)

1. To provide an optimum deciduous and coniferous AAC in order to meet the requirements of the FMA holder while meeting the requirements of the coniferous quota holder. The FMA holder is in the process of constructing an oriented strand board plant, which will have a minimum capacity of 250 million square feet (3/8 inch basis) as well as a sawmill-planer complex with a maximum capacity of 80 million board feet. (amended in 1996 to read 'To provide an optimum deciduous and coniferous AAC in order to meet the FMA and quota holder requirements).

2. To schedule the harvesting of timber such that it addresses the intent of the Brazeau-Pembina Integrated Resource Plan (deleted in 1996)

3. To provide Miscellaneous Timber Use AAC from the FMA for small individual operators

4. To finalize the green/white area zone boundary through the IRP process to minimize further land base losses for agriculture expansion (deleted in 1996)

5. To achieve full utilization of the coniferous and deciduous resource through integrated harvest operations

6. To develop intensive forest management strategies that will be implemented subject to provincial priorities in the future FMU plans. These strategies will look at management problems arising from a shrinking productive land base and the impact on regenerated yields, resulting from mixedwood regeneration and integrated harvest operations.

7. To recalculate the R4 FMU coniferous and deciduous AACs by April 30th, 1991 in proposed land base exchanges between FMUs R3 and R4 are approved. The 1986 plan will evaluate the impact of these changes. (deleted in 1996 and replaced with 'To review this plan at the earliest by April 30th, 2001 to account for changes to current forest land base, FMU boundaries, the implementation of the AVI, and sustainable forest management. The updates to the 1986 R4 plan will be in effect until the Sundance's plan is prepared and approved'.

3.1.2 1987 Preliminary Management Plan for FMA8500023

The long-term objectives identified in the first Preliminary Forest Management plan were grouped into the following categories: timber development, multiple-use resource management, silviculture, operations, protection and inventory, and are described below.

Long-term Timber Development Objectives

- To achieve long-term sustained yield management based on the natural productivity levels of the FMA Area
- To assign all growing stock to either a coniferous or deciduous landbase as determined by species composition (i.e. stands that are predominately deciduous will be designated as deciduous land base and all predominately coniferous stands as coniferous landbase) for the purpose of determining the AAC.
- To calculate a net deciduous and coniferous annual allowable cut
- To minimize volume losses from declining yields and decadence associated with over mature age classes
- To operate the FMA as one working circle
- To maintain the current productive land base on a perpetual basis through the promotion of integrated resource management
- To utilize all deciduous timber harvested for OSB manufacture, and all conifer timber harvested for lumber production and pulp chip production, and
- To develop objectives for the assessment and management of coniferous understories

Multiple-use Resource Management Objectives

- To manage the FMA area within the guidelines outlined in "A Policy for Resource Management in the Eastern Slopes – Revised 1984' as well as the Brazeau-Pembina and the Rocky-North Saskatchewan Resource plans.
- To implement the IRP resource management guidelines
- To integrate other resources and uses such as wildlife, water and recreation into the overall management of the timber resource
- To minimize the impact of summer logging on fish and wildlife, watershed, recreation and public areas

Silviculture Objectives

- To reforest all coniferous and deciduous management cutovers to a minimum of 80% acceptable stocking
- To investigate the strategies and concerns regarding mixedwood management, with the intent to develop mixedwood management objectives for the DFMP
- To identify and inventory candidate supplemental reforestation areas jointly with SRD
- To provide and maintain a seed inventory for use in FMA reforestation
- To investigate intensive forest management strategies, with the intent to determine the feasibility of developing objectives for the DFMP which will increase the yield objectives beyond natural productivity levels
- To minimize the impact of summer logging on reforestation requirements by the proper selection of harvesting areas and methods, and
- To plan timber harvesting and cut block layout to minimize risk when prescribed burning is to be applied as a silvicultural tool

Operations Objectives

- To conduct harvesting operations on a year round basis so as to provide optimum cycling of harvested wood, stabilize employment of the logging force and maximize efficiency of the harvesting operations
- To identify cut-plan areas and units designated for summer logging and summer contingency wood in AOP submissions
- To integrate planning and harvesting operations with overlapping quota holders
- To sequence timber harvesting based on the following principles: over mature and endangered wood first priority; balanced haul distance; progressive development of roads, and confirmed integrated harvest scheduling of overlapping quota holders
- To process all coniferous timber in tree-length form and deciduous in short-wood form, and
- To plan harvest operations to be compatible with the resource management guidelines identified in the Brazeau-Pembina and the Rocky-North Saskatchewan IRPs.

Protection Objectives

- To limit annual timber losses from fire, insects and disease to 0.1% of the coniferous and deciduous landbase
- To salvage timber damaged from natural causes whenever feasible
- To perform fire prevention and fire suppression activities in cooperation with SRD
- To train and develop staff in fire suppression activities
- To informally monitor the timber resource for insect and disease damage, and to develop and implement control strategies should disease and insect problems be encountered in accordance the FMA agreement

Inventory Objectives

- To conduct a forest inventory
- To determine the forest inventory information required for the DFMP
- To cooperate with and assist Government resource management agencies in data collection on other resource values when deemed necessary
- To submit inventory updates
- To design permanent sample plots and procedures for a growth and yield program, and
- To establish a sampling method for over mature aspen stands which will lead to a prediction of volume decline over time due to stand break-up.

3.1.3 1992 Detailed Forest Management Plan for FMA8500023

The long-term objectives identified in the first Detailed Forest Management plan expanded beyond those approved in the Preliminary Forest Management Plan. Objectives were grouped into the following categories: timber development, integrated resource management, silviculture, operations, protection and inventory, and are described below.

Long-term Timber Development Objectives

- To maintain the current productive land base for the primary purpose of establishing, growing and harvesting timber on a perpetual basis while promoting the principle of multiple-use through integrated resource management
- To assign and maintain all of the productive forest land base to either a coniferous or deciduous landbase
- To determine a sustainable harvest level of harvest for both the coniferous and deciduous land bases over a period of two rotations

- To minimize timber losses associated with over mature and decadent forest through the scheduling of timber harvest
- To operate the FMA as one working circle
- To utilize deciduous timber harvested for OSB manufacture, and conifer timber for lumber manufacture and chip production
- To meet the demand for birch timber by utilizing residual birch from harvesting operations for other species
- To identify balsam poplar in the forest inventory and to continue researching the utilization of balsam poplar in OSB manufacturing

Integrated Resource Management Objectives

- To manage the FMA area within the guidelines of the Eastern Slopes policy and related Integrated Resource Plans, recognizing the highest priority as watershed management
- To work cooperatively with government agencies in their management of other resources on the FMA
- To minimize the impact timber harvesting and reforestation operations on other resources such as fish, wildlife, watershed and recreation resources by the proper selection of operating areas, methods and timing of harvest
- To obtain public input into the Forest Management Plan, and
- To integrate harvest inventory with the development of future forest inventories.

Silviculture Objectives

- To reforest all harvested areas to meet or exceed the standard set forth in the Timber Management Regulation in the most cost effective manner,
- To maintain stocked coniferous and deciduous land bases by reforesting areas to their original land base designations or a balance of alternate land base designations when warranted by assessment of silvicultural and operational factors,
- To minimize the negative impact of timber harvesting and silviculture treatments on an areas potential for reforestation by integrating appropriate harvest designs, harvest methods and silviculture regimes,
- To record silviculture assessments and activities,
- To identify and inventory candidate supplemental reforestation areas jointly with SRD,

- To enhance the yield of future regenerated stands through the implementation of a tree improvement program, and
- To conduct or participate in the research and development of strategies and techniques, which will a) achieve prompt and successful reforestation and b) produce the optimum yield of volume and species under the current utilization regime.

Operations Objectives

- To sequence timber harvesting based on the following principles:

    a. over mature or endangered stands first priority,
    b. balanced haul distances and progressive development of roads,
    c. recognition of the current conifer sequencing for the overlapping Quota allocations,
    d. utilization of all deciduous timber generated by the overlapping Quota operations,
    e. incorporation of integrated resource management guidelines, and
    f. incorporation of harvest with strategic fuel breaks where feasible.

- To conduct harvesting operations on a year round basis so as to:

    a. stabilize employment of the timber harvesting force,
    b. provide optimum cycling of harvested wood, and
    c. maximize efficiency of the harvesting operations.

- To minimize environmental disturbances from timber harvesting through adherence to the ground rules
- To develop and adopt pre-disturbance watershed assessment guidelines in the development of operating plans
- To integrate specific fish and wildlife habitat protection guidelines in harvest planning and operations
- To minimize damage to coniferous understories during harvesting operations

Protection Objectives

- To perform fire prevention and fire suppression activities in cooperation with SRD
- To salvage and utilize timber damaged from natural causes whenever feasible as determined by the degree of damage and the locale
- To monitor the timber resource in cooperation with Government agencies for insect and disease damage, and when warranted to develop and implement control strategies for such damage jointly with SRD

Inventory Objectives

- To complete a collective vegetation inventory of the FMA area during the Plan period to serve as the basis for future forest management plans
- To utilize information from permanent sample plots to be established by the company, or from those plots established by the Province or other agencies, in order to meet future forest inventory requirements,
- To cooperate with and assist Government resource management agencies in data collection on other resource values, and
- To establish and maintain an area summary of all land use activities for the purpose of defining the net FMA area and establishing a complete land inventory.

3.1.4 1998 Preliminary Forest Management Plan for Expanded FMA 8500023

In 1997 the FMA boundary was expanded to include most of the other timber harvesting landbase Weyerhaeuser operated in to supply wood to the Drayton Valley facilities. A Preliminary Forest Management Plan was submitted to SRD in January of 1998 and approved the same year. The following goals and objectives were developed in the plan.

Operations: The goal was to meet or surpass all requirements and guidelines set by government agencies regarding timber-harvesting activities. To accomplish this, the Company's strategies were:

- To sequence timber harvesting based on the following principles:
  - Over mature or endangered stands for first priority,
  - Balanced haul distances and progressive development of roads,
  - Recognition of the current conifer sequencing for the overlapping Quota allocations,
  - Utilization of all deciduous timber generated by the overlapping Quota operations,
  - Incorporation of Integrated Resource Management guidelines, and
  - Incorporation of harvest with strategic fuel breaks where feasible.
- To minimize environmental disturbances from timber harvesting through adherence to the ground rules
- To minimize the impact on aesthetics by timber harvesting operations within visually sensitive areas
- To obtain stakeholder and public input in the development of timber harvest plans
- To conduct harvesting operations using methods that allow for year round harvesting so as to:
  - Stabilize employment of the timber harvesting work force,
  - Provide optimum cycling of harvested wood, and
  - Maximize efficiency of the harvesting operations.

- To minimize the amount of site disturbance from inter and intra block roads developed for harvesting and silvicultural operations
- To minimize damage to coniferous understories during harvest operations
- To salvage and utilize timber damaged from natural causes whenever feasible as determined by the degree of damage and the locale
- To promote local employment through the continuation of the 'Local Loggers Program'

Integrated Timber Operations: Weyerhaeuser's goal was to work cooperatively with other timber operators on the FMA Area to ensure that the FMA Area as a whole is managed for the sustainable production of timber and other resource values. To accomplish this, the Company's strategies were:

- To ensure that other timber operators accept this plan as 'the' forest management plan for the area and contribute to its management objectives and strategies,
- To minimize the amount of deciduous timber harvested by other operators on the FMA Area form within their Coniferous Timber Licenses and Permits,
- To abide by the letter of understanding between Weyerhaeuser and SRD to ensure that the demand for birch timber will be met from Company and Quota harvested areas as a first priority,
- To cooperate with SRD and the Local Advisory Committees to ensure that all parties abide by the Forest Management Agreement and the letter of understanding between Weyerhaeuser and SRD (regarding MTU volumes as a part of the FMA agreement), and
- To comply with the data sharing agreement between Weyerhaeuser and SRD.

Silviculture: Weyerhaeuser's goal was to regenerate and grow the forest in order to maintain a full range of forest values and to support a sustainable harvest level. To accomplish this, the Company's strategies were:

- To regenerate harvested areas to fulfill expectations of the timber supply analysis for sustained yield,
- To maintain forest stocking and composition by reforesting stands to the same stand type as the original stand or providing a balance of stand types in regenerating stands that reflects the stocking and composition of pre-harvest stands,
- To promptly regenerate harvested areas,
- To reforest all harvested areas to meet or exceed the standard set forth in the Timber Management Regulation and Alberta Regeneration Survey Manual,
- To gain experience and understanding of the use of alternative silvicultural systems through implementing operational trials,
- To investigate opportunities for the use of enhanced forest management treatments,
- To investigate the opportunities to rehabilitate and restock potentially productive or under stocked sites,
- To continue to develop genetically improved materials in spruce and aspen by implementing cooperative breeding strategies, and
- To maintain a record of Weyerhaeuser's silviculture activities on the FMA.

Biodiversity, Wildlife, and Fisheries Values: Weyerhaeuser's goal was to practice ecologically based forest management which will maintain forest ecosystems within the range of natural variability while providing societal benefit. To accomplish this, the Company's strategies were:

- To address the conservation of biodiversity by maintaining a variety of stand sizes, seral stages and stand attributes and structures across landscapes within the range of natural variation and consistent with silvicultural and operational constraints,
- To ensure that forest practices do not unduly affect the availability of habitat for socially valuable species by working cooperatively with Alberta Environmental Protection in their management of wildlife and fisheries resources,
- To ensure the maintenance of fish and wildlife habitat available prior to and after timber harvesting through adherence to the ground rules,
- To mitigate the negative impact of timber harvesting operations on habitat availability,
- To address the conservation of biodiversity, to provide protection for wildlife and their habitat and to gain experience and understanding on the use of alternative silviculture systems as a wildlife and fish habitat management tool,
- To identify rare, endangered and threatened species that inhabit the FMA Area and integrate their habitat requirements into forest management planning,
- To work cooperatively with Fish and Wildlife Division to identify and mitigate the impact of timber harvesting operations in critical wildlife zones,
- To mitigate the impact on wildlife species by minimizing the amount of inter and intra block roads developed for harvesting and silviculture operations,
- To protect habitat areas which are critical for the sensitive fish populations,
- To inventory wildlife and fish populations as specific concerns arise and as needed for forest management planning, and
- To continue to assess the distribution of selected wildlife species, to monitor their response to forest management, and to adjust practices accordingly.

Watershed: Weyerhaeuser's goal was to follow the laws and rules in place to protect waterways and water quality. To accomplish this, the Company's strategies were:

- To manage the FMA Area within the guidelines of the Eastern Slopes Policy and related Integrated Resource Plans, recognizing the highest priority as watershed management.

Recreation: Weyerhaeuser's goal was to actively promote the responsible use of our precious forests for recreation activities. We welcome advice from recreation users as we plan our field activities. To accomplish this, the Company's strategies were:

- To minimize the impact of timber harvesting and reforestation operations on recreation resources by the proper selection of operating areas, methods and timing of harvests on the FMA Area

Grazing: Weyerhaeuser's goal was to work cooperatively with Government agencies in their management of domestic stock grazing on the FMA Area, provided that the net landbase will not be put in jeopardy and regeneration will not be unduly damaged.

Oil and Gas: Weyerhaeuser's goal was to work cooperatively with Government agencies in their management of geophysical exploration, and oil and gas developments on the FMA Area. To accomplish this, the Company's strategies were:

- To work cooperatively with the energy sector to ensure utilization of salvage timber form exploration and land developments,
- To use existing oilfield access wherever possible to minimize land developments,
- To provide annual operating plan information to oilfield operators in advance of harvesting operations, and
- To establish clear lines of communication and consultation during and after timber operations.

Ecological and Historical Resources: Weyerhaeuser's goal was to work cooperatively with Government agencies to ensure that significant features of archaeological, ecological or historical value on the FMA Area are identified, protected and managed.

Protection: Weyerhaeuser's goal was to continue to work cooperatively with Government agencies at the Provincial and Municipal levels to protect all resource values in our care. To accomplish this, the Company's strategies were:

- To perform fire prevention and suppression activities in cooperation with SRD as detailed in an Annual Fire Control Plan subject to the requirements of the Fire Control Agreements,
- To monitor the timber resource in cooperation with Government agencies for insect and disease damage, and when warranted to develop and implement control strategies for such damage jointly with SRD, and
- To monitor and control the spread of noxious weed due to Weyerhaeuser's timber harvesting operations.

Research and Development: Weyerhaeuser's goal was to be committed to being an industry leader in stewardship on public forestland. We continuously improve our management practices to sustain environmental quality and enhance the economic value of forests entrusted to us.

3.2 Proposed Goals

Ecological, societal and economic values are represented in the management planning process by alignment with the DFMP goals.

Weyerhaeuser, with the involvement of the Forestry Advisory Committee and input from key stakeholder groups, has developed a set of goals for use in the DFMP. These Goals were reviewed and approved by Alberta Sustainable Resource Development on March 8, 1999.

Goals are defined as:

> Broad statements of intent or direction relative to an aim, end or state of being to be achieved at some point in the future or maintained over a period of time.

The DFMP Goals will be in place until replaced by the next DFMP.

Appendix 3-1 contains the summary document of the public input received during the development of the DFMP Goals and needs of other timber operators.

Goal 1: Ensure that Weyerhaeuser's Drayton Valley facilities remain globally competitive with respect to fibre supply from the FMA Area.

The intent of Goal #1 is to:

- Provide for low cost/ good value timber
- Recognize the value of jobs, economic distribution, and supply of wood
- Provide an acceptable return to Weyerhaeuser's shareholders
- Provide an economic return to Alberta
- Maintain Weyerhaeuser's economic viability in order to contribute to the local economy
- Maintain access to and security of the timber resource
- Recognize the rights and needs of other timber operators.

Goal 2: Maintain forest diversity at the stand and landscape level in terms of structure, composition, and function.

The intent of Goal #2 is to:

- Recognize the values of: biological diversity, wildlife and habitat, old growth, protected areas, ecosystem integrity, trees, and vegetation
- Conserve habitat for rare and endangered species.
- Provide habitat for all species (e.g., biodiversity).
- Improve our knowledge of the response of fish and wildlife to our forest management activities.
- Maintain a forest of all different age classes over time.

Goal 3: Maintain the productive capacity of the forest.

The intent of Goal #3 is to:

- Recognize the value of soil productivity
- Maintain soil productivity, and
- Maintain nutrient cycling processes.

Goal 4: Maintain the integrity of watersheds.

The intent of Goal #4 is to:

- Recognize the values of: water quality, fisheries, water quantity, healthy watersheds, and functional riparian areas
- Maintain the structure and function of riparian areas, and
- Maintain within the natural range of water quantity and quality.

Goal 5: Improve public acceptance of Weyerhaeuser's – Drayton Valley forest management activities.

The intent of Goal #5 is to:

- Obtain meaningful input from the public on our forest management activities.
- Ensure ongoing consultation with stakeholders, including an issue resolution process.
- Educate and communicate with the public about the forest, and Weyerhaeuser's forest management activities
- Demonstrate commitment to and progress towards continuous improvement of Weyerhaeuser's skills in forest management and knowledge of ecosystem processes.
- Manage and conduct our forest management activities in a socially acceptable manner

Goal 6: Integrate with the management activities of other resource users.

The intent of Goal #6 is to:

- Manage access issues resulting from Weyerhaeuser's forest management activities.
- Work cooperatively with other resource users such as: other timber operators, the oil and gas industry, the grazing disposition holders, etc.
- Work cooperatively with recreational, and tourism stakeholders.
- Minimize visual impacts in sensitive areas.
- Cooperate with all land neighbors in the implementation of Weyerhaeuser's forest management activities.
- Work proactively to build mutually beneficial relationships with First Nations and Métis groups.

Goal 7: Protect unique archeological and ecological sites.

The intent of Goal #7 is to:

- Identify important archeological and ecologically sites during operational planning and consult appropriate authorities for protection requirements.

Goal 8: Increase the sustainable harvest level of deciduous and coniferous timber from the FMA Area.

The intent of Goal #8 is to:

- Improve timber utilization.
- Improve the utilization of lands for forest production.
- Improve forest yield
- Maintain or increase the area of forested land that is dedicated to timber production.
- Decrease loss of timber from natural causes.

APPENDIX 1-1

ECOLOGICAL CLASSIFICATION OF THE WEYERHAEUSER DRAYTON VALLEY FMA

APPENDIX 1-2

WATERSHED AND STREAMS CLASSIFICATION PROJECT: WEYERHAEUSER – EDSON/DRAYTON VALLEY

APPENDIX 2-1

DRAYTON VALLEY FOREST MANAGEMENT AGREEMENT

APPENDIX 2-2

ECOLOGICALLY BASED FOREST MANAGEMENT

THE CONSERVATION OF BIODIVERSITY IN WEYERHAEUSER CANADA FOREST MANAGEMENT AREAS IN ALBERTA, DECEMBER 1997

APPENDIX 3-1

GOALS FOR WEYERHAEUSER'S DRAFT DFMP