



SYU R12

Detailed Forest Management Plan

2000 - 2015

Volume III

Chapter 5: Forest Management Strategies and Objectives

Chapter 6: Implementation of Plan

Chapter 7: Performance Monitoring

Chapter 8: Future Considerations

Weyerhaeuser Company Ltd.

Drayton Valley, Alberta



Foreword

This is Volume III 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.



Table of Contents

5	FOREST MANAGEMENT OBJECTIVES AND STRATEGIES.....	5-1
5.1	Fibre Supply	5-3
5.2	Forest Diversity.....	5-6
5.3	Ecosystem Capacity	5-7
5.4	Watersheds	5-8
5.5	Public Accountability.....	5-9
5.6	Resource Integration	5-12
5.7	Unique Sites	5-16
5.8	Increasing the Timber Supply.....	5-17
6	IMPLEMENTATION OF PLAN.....	6-1
6.1	Timber Operations.....	6-1
6.1.1	Sequencing.....	6-1
6.1.2	Harvesting and Hauling Methods.....	6-3
6.1.3	Road Development.....	6-4
6.1.4	Temporary In-block Roads	6-4
6.1.5	Salvage.....	6-4
6.1.6	Green-up Constraints	6-5
6.1.7	Understorey Protection	6-5
6.1.7.1	Planned Protection	6-5
6.1.7.2	Avoidance Protection.....	6-6
6.1.8	Transition Assumption for Regenerating Stands.....	6-6
6.1.9	Silviculture.....	6-6
6.1.10	Incidental Coniferous and Deciduous Timber Replacement Strategies on the FMA	6-8
6.1.11	Potentially Productive Area.....	6-8
6.1.12	Periodic and Quadrant Reconciliation Volumes	6-8
6.1.13	Cut Control Period Designation	6-9
6.1.14	Weyerhaeuser Non-FMA Volume Chargeability.....	6-9
6.2	Landscape Strategies.....	6-9
6.2.1	Biodiversity.....	6-9
6.2.2	Operational Planning Considerations	6-10
6.2.3	Grizzly Bear	6-20
6.3	Access Management.....	6-22
6.4	Watersheds	6-23
6.4.1	Watershed Analysis	6-23
6.4.1.1	Process.....	6-23
6.4.1.2	Process Improvement.....	6-25
6.5	Integrating Timber Operations.....	6-25
6.5.1	Deciduous Integration with Conifer Operations	6-26
6.5.1.1	Tall Pine Timber Co. Ltd.....	6-27
6.5.1.2	Dale Hansen Ltd.....	6-28
6.5.1.3	Non-Quota Timber Operations (CTP)	6-28
6.6	Integrated Resource Planning.....	6-31
6.6.1	Grazing	6-32
6.6.2	Trapping.....	6-32
6.6.3	Petroleum.....	6-34
6.7	Public Involvement in Planning Process	6-36
6.7.1	General Public	6-36
6.7.2	SYU Area Stakeholders.....	6-36
6.7.3	Forest Advisory Committee	6-37
6.7.4	Aboriginal Consultation.....	6-37
6.8	Ecological and Archeological Resources	6-37
6.8.1	Unique Ecological Resources.....	6-37
6.8.2	Historical Resources.....	6-38



6.9	Forest Protection and Health.....	6-38
6.9.1	Noxious Weeds.....	6-38
6.9.2	Fire Protection.....	6-39
6.9.3	Forest Health	6-40
6.10	Planning and Operating Ground Rules	6-40
6.11	Education & Training	6-41
6.12	Landuse Update Process	6-41
6.13	Re-Inventory of AVI	6-42
7	PERFORMANCE MONITORING	7-1
7.1	Timber Supply Sensitivity Analysis (validation of assumptions).....	7-1
7.2	Regeneration Standards.....	7-2
7.3	Annual Performance Monitoring Report	7-2
7.4	Stewardship Report.....	7-3
7.5	DFMP Objectives and Associated Indicators	7-3
8	FUTURE CONSIDERATIONS	8-1
8.1	Insects and Disease	8-1
8.2	Long-term Harvesting and Grazing Implications	8-1
8.3	Enhanced Forest Management	8-2
8.4	Jasper Park Boundary	8-3
8.5	Marshybank Ecological Reserve	8-3
8.6	Forest Inventory and Timber Supply Analysis.....	8-3
8.7	Ecological Sustainability	8-4
8.8	Alternative Regeneration Standards	8-4
8.9	Historical Resources Predictive Model.....	8-4
8.10	LMU for Areas Outside of FMA	8-4
8.11	Research and Long-term Monitoring.....	8-4
8.12	Adjustment of Salvage Chargeability and Tracking	8-5

List of Tables

Table 6-1	Variance from DFMP SHS	6-2
Table 6-2	Harvesting Methods Currently Used by Weyerhaeuser.....	6-3
Table 6-3	BCG by Age Definitions for Late Seral Stages	6-16
Table 6-4	BCG by Landbase Constraints Applied in the TSA.....	6-17
Table 6-5	Areas Used to Determine Impacts on Water Yields Within a Fourth-order Watershed Upon the SYU (Step #1).....	6-24

List of Figures

Figure 5-1	Framework of the Drayton Valley DFMP Goals, Objectives and Strategies	5-2
Figure 6-1	Tall Pine LMU Timber Harvesting Landbase by Coverture	6-28
Figure 6-2	Map of the Lodgepole Community Timber Program on FMA 8500023 (Jack Knife Harvest Design Area)	6-29
Figure 6-3	Lodgepole CTP Timber Harvesting Landbase by Coverture	6-30

List of Maps

Map 6-1	Eastern Slopes Integrated Plan	6-33
---------	--------------------------------------	------



List of Appendices

Appendix 6-1	Silviculture Strategies for the Drayton Valley FMA
Appendix 6-2	Monitoring Protocol for the Establishment and Growth of Trees on Temporary Roads upon the Weyerhaeuser Pembina (Edson and Drayton Valley) FMA's
Appendix 6-3	Stand Level Ecological Guidelines
Appendix 6-4	Drayton Valley FMA Stand Level Retention Monitoring Report: 1999-2004
Appendix 6-5	Fourth-Order Watershed Calculations
Appendix 6-6	Guidelines for Integrating Timber Harvesting and Domestic Grazing in the Green Area





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 than 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 its 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, roads and well sites.

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 melt waters 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.

I

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

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

Increment: Increase volume of a particular tree or stand over time.

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 fulfills, 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: Forest land 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 (Forman 1996).

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 even aged 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 of 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.

I

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 streamflow.

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.



5 FOREST MANAGEMENT OBJECTIVES AND STRATEGIES

In developing the DFMP, Weyerhaeuser's stewardship of the SYU Area was guided by a clear set of goals (see Chapter 3). Each goal has an associated intent statement that provides further clarity around what the goals mean.

A number of resource management objectives and activities are required to meet these goals. Appropriate management strategies were subsequently developed for each objective.

Objectives are defined as:

"A clear, specific statement of results or conditions to be achieved through implementation of the management plan".¹

Strategies are defined as:

Activities designed to achieve the goals or objectives.

The intent of the objectives and strategies in the DFMP is to conform to the Acts and Regulations of Alberta and Canada. It is not the intent to contradict any act or regulation, or to practice or promote unsafe or unhealthy practices.

The flowchart in Figure 5-1 illustrates the progression from goals to objectives and strategies.

All of the objectives will be pursued by timber operators on the FMA. Some of the strategies that support objectives will be pursued only by Weyerhaeuser.

Strategies to support the goals and objectives are not all inclusive. Over the life of the plan, these will continue to evolve. New strategies will appear, while obsolete ones will be discontinued in their use.

¹ A Sustainable Forest Management System: Specifications Document. 1996. CSA Standard CAN/CSA—Z809-96. Pg. 3.

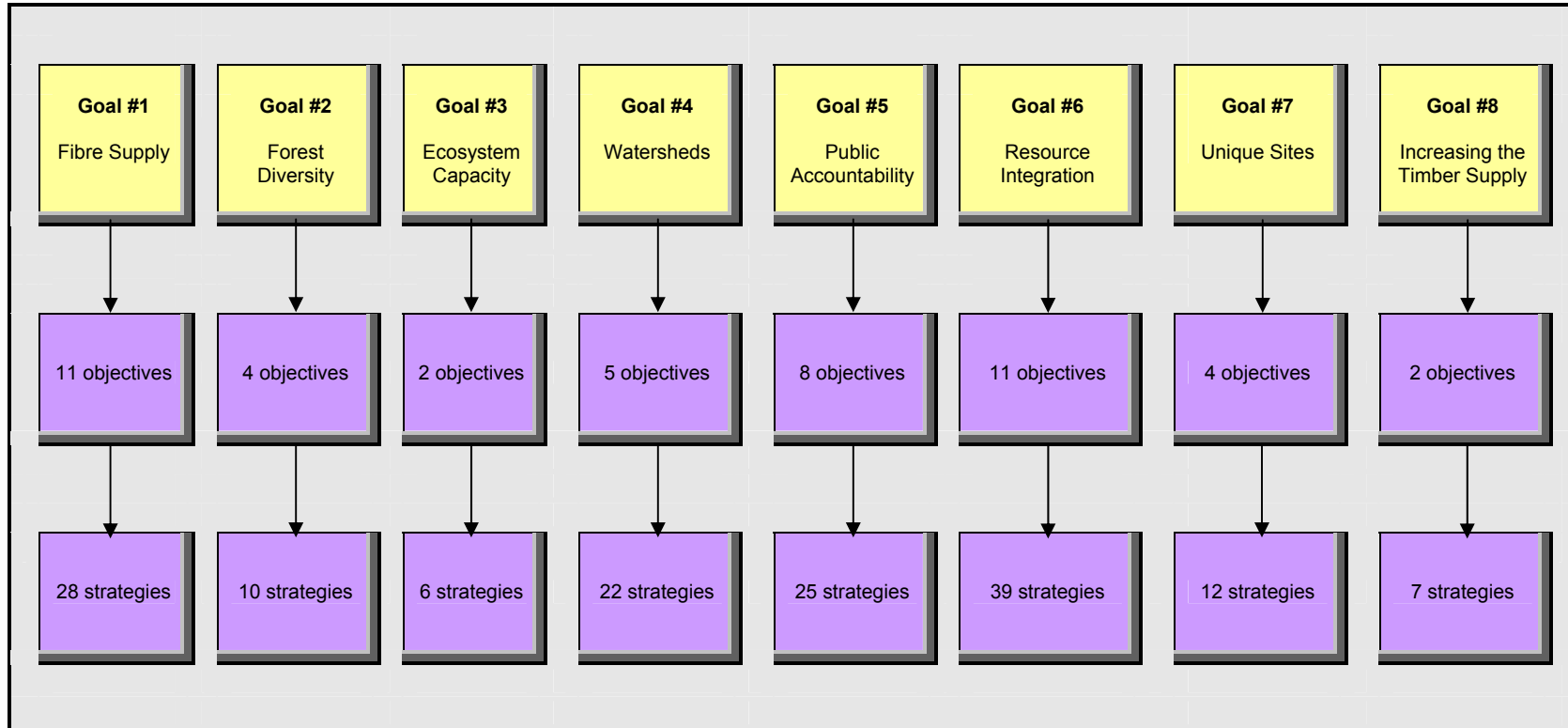


Figure 5-1 Framework of the Drayton Valley DFMP Goals, Objectives and Strategies



5.1 Fibre Supply

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



Objective 1.1: Maintain the Annual Allowable Cut

Strategies to achieve Objective 1.1 are:

- Balance the harvest by allocation within +/- 10% of the approved periodic 5-year allowable cut.
- Following the spatial harvest sequence (SHS) as outlined in the timber supply analysis.
- Increasing the knowledge of the timber resource through permanent sample plots (PSPs) and other growth and yield initiatives.
- Participating in fire risk assessment and suppression activities where appropriate.

Objective 1.2: Utilize salvage timber generated by exploration and land developments.

Strategies to achieve Objective 1.2 are:

- Salvage wood will have top priority in the Company's purchased wood program.
- Salvage from grazing dispositions has priority over other salvage.
- Salvage is charged as drain from the FMA.

Objective 1.3: Meet the Provincial reforestation standards for all corresponding stand types.

Strategies to achieve Objective 1.3 are:

- Balance the landbase exchanges to maintain the area within each of the Broad Cover Group.
- Ensure prompt reforestation of all harvest areas, utilizing appropriate reforestation prescriptions.



Objective 1.4: Maintain accurate silviculture records

Strategies to achieve Objective 1.4 are:

- Provide silviculture records to Sustainable Resource Development.
- Quota holders, in agreement with Weyerhaeuser, to provide minimum required harvest area history/activities.
- PLFD, in agreement with Weyerhaeuser, to provide minimum required harvest area history/activities.
- Develop a cooperative program for updating harvest areas annually.

Objective 1.5: Salvage dead and dying timber

Strategies to achieve Objective 1.5 are:

- Perform salvage operations as opportunities are available.
- Cooperate with Sustainable Resource Development in the reporting and monitoring of mountain pine beetle.

Objective 1.6: Include incidental birch in harvest designs and incorporate into annual planning to ensure appropriate utilization.

Strategies to achieve Objective 1.6 are:

- Identify any potential birch volume for all proposed cut blocks so as to identify sources in advance of harvesting.

Objective 1.7: Ensure utilization of deciduous volume from within harvest areas harvested by coniferous quota or non-quota operators

Strategies to achieve Objective 1.7 are:

- Utilize all deciduous volume within the harvest area, excluding those trees left for retention purposes.



Objective 1.8: Maintain the Sundance volume commitment as per FMA Agreement

Strategies to achieve Objective 1.8 are:

- Delivered volume to come primarily from the Elk River and Marshybank LMUs.
- Edson FMA will support this commitment, primarily from the Moose Creek LMU.

Objective 1.9: Expand timber harvesting and hauling season while minimizing any adverse environmental impacts

Strategies to achieve Objective 1.9 are:

- Ensure that summer ground is optimized by harvesting blocks at the appropriate time of year.
- Utilize low ground pressure tires during unfrozen ground conditions.
- Develop advance inter and intra block roads.
- Harvest in late winter to haul in early summer.
- Develop main summer intra and inter block roads during previous operating season so available when required.
- Implement strategy for block selection during spring and summer harvest to minimize impacts on wildlife such as nesting songbirds and calving ungulates.

Objective 1.10: Develop timber harvesting practices for slopes between 45% and 60%

Strategies to achieve Objective 1.10 are:

- Complete a terrain stability assessment for all harvest designs to ensure soil erosion is minimized.
- Submit detailed block plans for all harvest areas with slopes greater than 45%.



Objective 1.11: Maintain a balance of haul distances

Strategies to achieve Objective 1.11 are:

- Sequence stands across the entire SYU Area for all planning periods.



5.2 Forest Diversity

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

Objective 2.1: Implement Weyerhaeuser's Stand Level Ecological Guidelines

Strategies to achieve Objective 2.1 are:

- Retain vertical structure on harvest areas for an average of 5% merchantable timber.
- Leave pre-logging slash in harvest areas.
- Retain snags where possible.
- Foregoing opportunities to salvage selected fire killed and blowdown timber with consultation of PLFD.

Objective 2.2: Maintain stands which have old growth characteristics.

Strategies to achieve Objective 2.2 are:

- Maintain a minimum amount of area in the late, very late and overmature seral stage throughout the planning horizon.
- Identify potential areas of late, very late and overmature seral stages in excess of 125 ha in size during operational planning or during the development of the preferred spatial harvest sequence.

Objective 2.3: Maintain forest diversity at the stand and landscape level following the approved spatial sequence.

Strategies to achieve Objective 2.3 are:

- Follow the approved spatial harvest sequence that has allowances for a range of block sizes and shapes.
- Consult Crimson Lake Provincial Park management on the forest management requirements for operating adjacent to the Park in the Baptiste LMU.
- Cooperate with Jasper National Park and Sustainable Resource Development on the forest management requirements for the Marshybank LMU adjacent to Jasper National Park. Continue research over next five-year period to determine future forest management actions.



Objective 2.4: Follow IRP guidelines for operating in critical wildlife areas

Strategies to achieve Objective 2.4 are:

- All harvest designs will confirm the existence of critical wildlife areas and operating period constraints identified in Fish and Wildlife Division Referral Map for Geophysical Programs in the Rocky Clearwater Forest February, 1990 or most current version.

5.3 Ecosystem Capacity

Goal 3: Maintain the productive capacity of the forest.

Objective 3.1: Minimize the amount of road development by the Company.

Strategies to achieve Objective 3.1 are:

- Use existing roads and linear disturbances.
- Minimize the amount of permanent road developed by the Company in the Blackstone LMU.
- Participating in Integrated Land Management planning.
- Maintain access control points as identified in Integrated Land Management process, or access management plans.

Objective 3.2: Minimize the amount of site disturbance from road construction.

Strategies to achieve Objective 3.2 are:

- Utilize appropriate right of way widths.
- Minimize the total area to be disturbed for roads and landings in harvest areas to less than 5%.



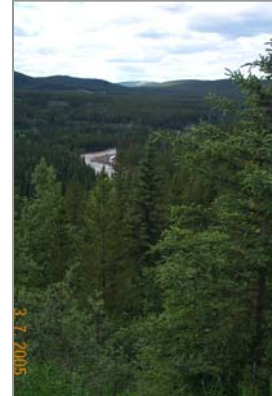
5.4 Watersheds

Goal 4: Maintain the integrity of watersheds.

Objective 4.1: Comply with the Provincial Water Act

Strategies to achieve Objective 4.1 are:

- Target full compliance to the ground rules to ensure no warnings or penalties are received from PLFD.
- Follow the “Code of Practice” from the Provincial Water Act.



Objective 4.2: Follow provincial guidelines and operating ground rules for road and crossing construction.

Strategies to achieve Objective 4.2 are:

- Follow the Provincial Stream Crossing Guidelines.
- Obtain the services of a qualified aquatic environment specialist on projects where “restricted activities” cannot be avoided.
- Take prompt re-vegetation and sediment control measures at stream crossings.
- Do annual inspections of watercourse crossings on the Company’s permanent roads.
- Classify unmapped watercourses.
- Utilize buffers of 30 and 60 meters on small and large permanent creeks, respectively.
- Commence and complete work on a watercourse during the allowable activity period.

Objective 4.3: Minimize erosion potential from temporary inter and intra block roads

Strategies to achieve Objective 4.3 are:

- Roll back the Company’s temporary roads once requirements are fulfilled.
- Take prompt re-vegetation and sediment control measures at stream crossings when identified.
- Limit the logging and crossing of watercourses in sensitive areas to frozen ground conditions.
- Consider seasonal restrictions in poorly drained and highly erodible areas.
- Minimize the number of stream crossings.
- Use watercourses where possible as block edges to avoid crossing.
- Complete detailed block plans for harvest areas with abundant watercourses.



Objective 4.4: Minimize adverse impacts on watersheds (quality, quantity and timing) resulting from forest operations.

Strategies to achieve Objective 4.4 are:

- Review fourth-order watershed output report in the TSA during the harvest design stage.
- Analyze the watershed using the Effective Clear Cut Area (ECA) model where required.
- Analyze watershed using WRENSS (Water Resource Evaluation of Non-Point Silvicultural Sources) model where required.
- Modify operational harvest plans to reduce impacts to water flow when analyzed results are at threshold levels.

Objective 4.5: Protect fish habitat

Strategies to achieve Objective 4.5 are:

- Maintain riparian buffers on all permanent streams and lakes.
- Follow provincial guidelines for road and crossing construction.

5.5 Public Accountability

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





Objective 5.1: Obtain meaningful input and advice from the public on our forest management activities.

Strategies to achieve Objective 5.1 are:

- Make Annual Operating Plans and harvest designs available for reading at the Company office, Sustainable Resource Development, during open houses or at other venues.
- Incorporate, where appropriate, input received during open houses, etc. into the planning process.
- Maintain ongoing consultation activities with affected and interested members of the public.
- Maintain the Forest Advisory Committee.

Objective 5.2: Educate and communicate with the public about the forest

Strategies to achieve Objective 5.2 are:

- Participate in, but not limited to, school presentations, National Forestry Week activities, and presentations to business community or other interested parties.

Objective 5.3: Provide updates to the FAC on the Company's operational planning

Strategies to achieve Objective 5.3 are:

- Seek input from the FAC members on harvest designs as their time allows.

Objective 5.4: Co-operate with Aboriginal groups

Strategies to achieve Objective 5.4 are:

- Follow Weyerhaeuser Aboriginal Policy when complete.
- Follow Alberta Aboriginal Consultation Guidelines.
- Seek input into harvest designs and AOPs.

Objective 5.5: Co-operate with all land neighbours.

Strategies to achieve Objective 5.5 are:

- Involve land neighbours (e.g. private land) in the development of harvest designs.
- Consult the community of Lodgepole to mitigate impact of forestry operations – aesthetics, safety.



Objective 5.6: Seek input into harvest design development from recreation and tourism operators.

Strategies to achieve Objective 5.6 are:

- Utilize computer visualization models for public reviews of harvest designs.
- Consult local recreation and tourism stakeholders for input into harvest design development as described in Weyerhaeuser's applicable EMS Guidelines and SFMP Indicators.
- Consult Crimson Lake Provincial Park management and associated commercial recreation users for Park boundary neighbor needs, trail protection, and aesthetic impact of forest operations.
- Consult representative users of Chambers Creek trails to determine need for trail establishment & protection, environmental issues (soil erosion at ATV crossings), aesthetics and safety along trails.
- Consult the management of the Chambers Creek campground to mitigate impact of forestry operations – aesthetics, log hauling, etc.
- Consult the management of the Blackstone campground to mitigate impact of forestry operations – aesthetics, log hauling, etc.
- Cooperate with Sustainable Resource Development to mitigate the impact of forestry operations on the adjacent Bighorn Backcountry.
- Consult the management of the Medicine Lake campground to mitigate impact of forestry operations – aesthetics, log hauling, etc.
- Cooperate with Sustainable Resource Development on the management requirements for operating adjacent to the Jack Knife Springs day-use site.
- Chungo Lookout HDA (adjacent to JNP) will not be scheduled for harvest until 2010.



Objective 5.7: Seek input into harvest design development from trapline operators

Strategies to achieve Objective 5.7 are:

- Contact all trapline holders during harvest design development.
- Consider design changes to minimize impacts to the trapline operation.



Objective 5.8: Maintain third-party certification

Strategies to achieve Objective 5.8 are:

- Maintain ISO certification.
- Maintain CSA certification.

5.6 Resource Integration

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

Objective 6.1: Ensure the Company's harvesting practices do not unduly impact the viewshed in sensitive areas

Strategies to achieve Objective 6.1 are:

- Utilize a harvest design *viewshed assessment* process in appropriate harvest designs as described in Weyerhaeuser's applicable EMS Guidelines and SFMP Indicators.
- Develop operational Ground Rules for operating along the highway 11 corridor.
- Investigate opportunity with Sustainable Resource Development and commercial recreation users to establish a designated trail program in the Blackstone and Marshybank LMUs resulting from an access management plan.
- Develop operational Ground Rules for operating along the Forestry Trunk Road corridor.
- Mitigate the impact on the viewshed integrity along the Brazeau River corridor.
- Mitigate the impact on the viewshed integrity along North Saskatchewan River corridor.
- Mitigate the impact on the viewshed integrity along the North Saskatchewan River corridor in the Tall Pine and Willesden Green LMUs.
- Develop operational Ground Rules for operating along the highway 22 corridor.



Objective 6.2: Prepare integrated operating plans for all grazing dispositions scheduled in an AOP

Strategies to achieve Objective 6.2 are:

- Ensure all parties (the grazing disposition holder, the Company and Sustainable Resource Development) sign off on the completed integrated operating plan e.g. Silviculture Range Working Agreement.
- Retain access where grazing operator assumes responsibility.
- Formulate plans that minimize impact of harvesting.
- Identify areas where timber harvesting is sequenced on the GDP.
- Develop detailed reforestation plan for all harvesting activities.

Objective 6.3: Inform grazing disposition holders of forestry operations adjacent to their disposition

Strategies to achieve Objective 6.3 are:

- Contact grazing disposition holders at the appropriate planning stage(s).

Objective 6.4: Identify operational concerns and opportunities for oil and gas operations prior to operations commencing.

Strategies to achieve Objective 6.4 are:

- Provide AOP information to oilfield operators upon request, and
- Consult with oilfield operators on proposed permanent access development.





Objective 6.5: Maintain an accurate inventory

Strategies to achieve Objective 6.5 are:

- Periodically update disturbances on the SYU, and
- Re-inventory AVI prior to the next DFMP.

Objective 6.6: Continue to support the intent and guidelines of the Alberta Trappers Compensation Program Policy and Procedures

Strategies to achieve Objective 6.6 are:

- Inform all trappers of the Compensation Program as part of consultation process in harvest design development.
- Attempt to resolve any compensation issues with the trapper prior to the issue being referred to the Compensation Board.

Objective 6.7: Cooperate with other resource stakeholders in the development of shared access development

Strategies to achieve Objective 6.7 are:

- Consult local energy property owners on the Company's proposed main road plans as described in Weyerhaeuser's applicable EMS Guidelines and SFMP Indicators.
- Continue to participate with other industrial users and cooperate with Sustainable Resource Development in the Chungo ILM process (Blackstone & Marshybank).
- Continue to monitor the success of the Access Management Plan for the Nordegg corridor and use acquired information in the development of other access management plans (Nordegg River).
- Plan and develop the main haul route(s) in consultation with other resource users and Sustainable Resource Development (Blackstone and Marshybank).
- The Company will not build any permanent road into the area adjacent to Jasper National Park (Chungs Lookout).



Objective 6.8: Maintain current practices of access control where requested by Sustainable Resource Development.

Strategies to achieve Objective 6.8 are:

- Report or meet annually with Sustainable Resource Development to review access concerns and plans including those described in Weyerhaeuser's applicable EMS Guidelines and SFMP Indicators.
- The Company will not build any permanent road into the area adjacent to Jasper National Park (Marshybank).
- Cooperate with Sustainable Resource Development and resource stakeholders to establish an access management plan for the area (O'Chiese).
- Maintain access control points as identified in Integrated Land Management process, or access management plans.
- Follow the Chungo ILM process.

Objective 6.9: Provide spatial harvest schedule (SHS) to SRD supporting the Local Timber Permit Program and Lodgepole Community Timber Program (CTP)

Strategies to achieve Objective 6.9 are:

- Provide a spatial harvest schedule for two 10-year periods utilizing predominately conifer (C & CD) stands.
- Complete preliminary harvest designs for the Lodgepole CTP in consultation with Sustainable Resource Development and the Local Advisory Committee.

Objective 6.10: Develop integrated (deciduous and coniferous) harvest designs

Strategies to achieve Objective 6.10 are:

- Complete preliminary harvest designs for the Lodgepole CTP in consultation with Sustainable Resource Development and the Local Advisory Committee.
- Review harvest designs and Annual Operating Plans developed by other timber operators on the SYU Area as provided by SRD or the operator.
- Provide spatial harvest schedules for two 10-year periods to Tall Pine Timber and Dale Hansen Ltd. from conifer predominant stands in the Tall Pine and O'Chiese LMUs respectively.
- Utilize existing harvest designs to develop SHS for all operators.



Objective 6.11: Cooperate with provincial and municipal governments in monitoring, preventing the establishment of and controlling restricted and noxious weeds on the Company's operating areas as identified in Directive 2000-06.

Strategies to achieve Objective 6.11 are:

- Conduct annual training as required with operations and planning personnel.
- Perform annual inspections of the Company's permanent roads.
- Document and report all sightings of restricted and noxious weeds during operational survey work.
- Participate in Weed Management Co-Op.

5.7 Unique Sites

Goal 7: Protect unique archeological and ecological sites.

Objective 7.1 Identify and protect unique ecological sites.

Strategies to achieve Objective 7.1 are:

- Follow established procedures to identify and protect sites.
- Cooperate with the provincial government in developing and implementing management requirements for operating adjacent to the O'Chiese Natural Area (O'Chiese LMU).
- Establish forest management practices to protect sand dunes (Sand Creek LMU).
- Maintain database for unique ecological sites.

Objective 7.2: Identify and protect historical resources

Strategies to achieve Objective 7.2 are:

- Implement a historical resources management system that provides for identification and reporting of findings, verification of finds, and recognition of potential for resources to occur.
- Maintain database of historical resources.



Objective 7.3: Identify, record and track areas of special importance to plant and wildlife species

Strategies to achieve Objective 7.3 are:

- Develop and maintain a database for areas of special importance to plant and wildlife species.
- Determine, with Sustainable Resource Development, the possible ungulate focus for habitat management in the Nordegg River LMU.
- Determine, with Sustainable Resource Development, the possible ungulate focus for habitat management in the Willesden Green LMU.

Objective 7.4: Maintain habitats for rare, endangered and threatened (RET) species (flora and fauna).

Strategies to achieve this objective are:

- Maintain inventory of RET species.
- Protect known sites.
- Co-operate in research with other agencies and industrial users.

5.8 Increasing the Timber Supply

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

Objective 8.1: Identify opportunities to increase the level of forest production from the production landbase.

Strategies to achieve Objective 8.1 are:

- Develop a site rehabilitation program for areas that have received reclamation certificates from SRD.
- Assist Oil and Gas companies with reforestation activities of reclaimed dispositions.
- Involvement in Enhanced Forest Management (EFM) research and operational trials.
- Participation in a genetics program.





Objective 8.2: Participate in a forest health reporting and monitoring program with Sustainable Resource Development.

Strategies to achieve this objective are:

- Participate in training exercises as required to improve operational and planning staff knowledge about forest health agents.
- Document and report significant sightings of insects and diseases during operational survey work.
- Continue participation in the Sustainable Resource Development Regional Insect and Disease working group.



6 IMPLEMENTATION OF PLAN

The implementation plan will identify potential changes in policy and provide direction for conducting forest management practices. As identified in Chapter 4 of the DFMP, 'Weyerhaeuser Forest Management Philosophy and the Planning Process', Weyerhaeuser will practice adaptive management upon the FMA, the benefits of which include:

- ◆ Confidence in forest management practices by identifying variances between forecasted conditions and actual conditions,
- ◆ Flexibility in adjustments to management for identified variances, and
- ◆ Accumulation of an information base for continued improvement for future planning requirements.

The avenue for implementation of goals, objectives and strategies of the DFMP will be the production of a General Development Plan (GDP) and an Annual Operating Plan (AOP). The guiding document for the development of the GDP and the AOP will be the Ground Rules.

6.1 Timber Operations

The timber-operating year is defined as May 1st to April 30th.

6.1.1 Sequencing

The timber supply models being used (Woodstock and Stanley) provide information on the shape, size, and distribution of harvest areas for the first twelve periods (60 years). Harvest areas identified through previous planning exercises have been scheduled for harvest over the next 25 years, with higher proportions of these planned blocks appearing in periods one to three.

The first 5-year period is from November 18th, 2000 to November 17th, 2005. Due to the timing of submission and approval of this plan, most of the first period blocks are already harvested.

For planning purposes, the spatial harvest sequence (SHS) for the first five periods will be utilized. It is expected that the SHS as submitted and approved, will be followed by all timber operators. Harvest areas are identified by operator for the duration (2000-2015) of this DFMP.

Stand conditions (i.e. age, health, etc.) unaccounted for in the inventory may arise that would result in endangered timber conditions or a requirement to harvest damaged, dying or dead timber. Similarly there may be site-specific management objectives that could not be accounted for in the DFMP analysis, or that arose after the DFMP submission, which would preclude or require timber harvesting for a given stand. As well, implementation of a sequenced stand may be changed due to operational factors not within the scope of the Detailed Forest Management Plan.

Variances to the SHS will most likely occur. Table 6-1 describes potential reasons for variances to the plan. Variances will not be tracked for period one of the plan due to the timing of submission as described previously. Variances will be tracked starting with the timber year following DFMP approval (i.e. May 1st, 2006).

**Table 6-1 Variance from DFMP SHS**

<p>1. Additions</p> <ul style="list-style-type: none"> ◆ fire damaged (including risk) ◆ affected by insects and disease ◆ rapidly declining stand volume ◆ blowdown ◆ pending alternate land uses ◆ Inventory polygon size constraint (i.e. portions of an adjacent unsequenced polygon may be added to a block to meet environmental or operational objectives) ◆ Marginal stands ◆ Switch stands
<p>2. Subtractions</p> <p>a) Deferrals</p> <ul style="list-style-type: none"> ◆ Watershed analysis restrictions ◆ Specific habitat requirements ◆ Stakeholder concerns ◆ Ground Rules requirements ◆ New management initiatives ◆ Research Requirements, i.e. PSPs, ISPs, etc. ◆ Block size combined with location (i.e. isolated small block) ◆ Greenup not accounted for in the TSA ◆ Harvesting season restrictions ◆ Low volume ◆ Immature stands ◆ Understorey is more valuable than overstorey
<p>b) Deletions</p> <ul style="list-style-type: none"> ◆ Inclusion of wrong strata into spatial sequence ◆ Unique finds ◆ Small scale landuse developments ◆ Ground rule requirements

The above table is not an exhaustive list, but identifies the most common issues when operationalizing a strategic plan.

Variance from the spatial harvest sequence (SHS) will be tracked during the operational final harvest planning stage for Land Management Unit (LMU). Additions will be cumulative and should not exceed the SHS area, by decade, without approval from SRD.

Subtractions (deferrals and deletions) will be tracked separately from additions. Cumulative subtractions to final harvest plans for each LMU should not exceed 20% of the SHS without approval from SRD.



6.1.2 Harvesting and Hauling Methods

The harvesting and hauling methods adopted by the Company were selected to meet the following criteria:

- ◆ minimize environmental impacts;
- ◆ increase the efficiency in implementing dominant silviculture regimes;
- ◆ decrease the cost of delivered wood;
- ◆ maximize safety;
- ◆ meet requirements for piece size, wood quality, and delivery schedules;
- ◆ align with public values.



Table 6-2 below represents the predominate harvesting methods currently used by Weyerhaeuser.

Table 6-2 Harvesting Methods Currently Used by Weyerhaeuser

Phase	Deciduous	Coniferous
felling	mechanical	mechanical
skidding	rubber tired grapple, or forwarder (“wide” tired during unfrozen conditions)	rubber tired grapple, or forwarder (“wide” tired during unfrozen conditions)
limbing / topping	stump side or roadside; mechanical	stump side or roadside; mechanical
bucking	roadside mechanical	roadside mechanical
hauling	shortwood (2.6m) or treelength	treelength or cut to length

All harvesting operations are currently contracted on a “stump to dump” or “stump to roadside” basis.

The Company has initiated a skills development program to improve its technical knowledge of logging on steep slopes (between 45% and 60%). In the development of harvest designs a terrain stability assessment will be provided to identify sensitive sites due to the presence of, but not limited to, seepage, proximity to watercourses, and steep slopes (greater than 45%). In cooperation with our logging contractors, the Company will develop methods for timber harvesting on steep slopes in an environmentally sound, safe and cost effective manner. Harvesting on all steep slopes (in excess of 45%) will be conducted in a manner that will minimize soil erosion.

Specific to hauling, the Company is utilizing Central Tire Inflation (CTI) technology to extend the hauling season. Also, the Company has developed timber harvest sequencing to balance the haul distance during the planning horizon.



6.1.3 Road Development

Public and private roads provide relatively good access to the SYU Area. Figure 1.18 in Chapter 1 - Section 1.2.8.1 shows the extent of existing road development across the SYU Area, by Landscape Management Unit.

Weyerhaeuser has completed the Nordegg River Road, which connects the Sunchild Road with the Forestry Trunk Road. The Nordegg River Road is a long-term (> 5 years) road that runs east/west between the Brazeau River and the Nordegg River. Permanent road construction is generally expected to be short term (< 5 years) up to class III standards, according to the Ground Rules. All existing and proposed permanent road construction will be presented in the General Development Plan submissions. During this Plan period the Company will be evaluating route selection and developing access to and within the Blackstone and Marshybank LMUs.

6.1.4 Temporary In-block Roads

Concerns have been identified regarding the impact of temporary haul roads developed to extract wood from harvest areas. In the Pembina Forestlands, in-block road building is estimated to be in the range of 3% of the total harvested areas. This is based on analysis of roads over several years.



Strategies for regenerating temporary in-block roads are described in Appendix 6-1. In addition regeneration performance on temporary in-block roads will be monitored to assess impacts in terms of stocking and performance of regeneration. The monitoring protocol for temporary in-block road monitoring is described in Appendix 6-2.

The following establishment survey information will be required by Weyerhaeuser from all operators to complete the analysis to be undertaken: opening number; strata declaration; all information collected for each 'R' plot; season of operation during initial harvest; reclamation strategy applied to roads.

6.1.5 Salvage

Weyerhaeuser remains committed to using salvage (dead or dying) timber on the SYU Area. The primary concerns in the utilization of dead timber are:

- ♦ for deciduous timber, the effect of moisture loss on wood ultra-structure, the ability to accommodate the timber in drying processes, and increased wood decay; and
- ♦ for coniferous timber, wood degradation from insects and introduced pathogens, and physical damage associated with moisture loss.



The amount and location of dead timber are operational factors that may determine the feasibility of use. Regardless, the most important objective is prompt harvesting and utilization after the time of injury or mortality.

Not all fire-killed areas will be harvested. Some areas will remain intact so that they can be represented on the landscape. Volumes may contribute to structure retention strategies.

6.1.6 Green-up Constraints

Green-up constraints are applied in the TSA with the assumption² that harvest areas are sufficiently regenerated and provide sufficient hiding cover for large game species. The spatial harvest sequence has accounted for green-up, therefore no height requirements for regenerating stands are necessary during ground rule development.

The amount of structure (see Stand Level Ecological Guidelines Appendix 6-3) that remains in harvest areas after logging has increased also substantially recently. This includes snags, green tree retention, understorey protection and lesser vegetation along adjacent right-of-ways. The retention of variable vertical structure, along with the growth of regeneration, contributes to the screening capacity of the site.

The green-up constraints used in the management units are as follows:

- ♦ Pure conifer (C) blocks is 15 years (two periods). For the remaining strata (CD, DC, and D), the green-up period is ten years (one period). (See Volume II, Chapter 4.)

6.1.7 Understorey Protection

Understorey protection will be practiced across the Unit. Techniques will vary depending on the assumptions made in the Timber Supply Analysis and the characteristics of the understorey. Understorey protection can be described as either 'planned' or 'avoidance'.

6.1.7.1 Planned Protection

Planned protection of understorey will occur when the TSA assumptions dictate that understorey is recognized in future yields. This occurs only within the 'switch' stands where the yield curves are pointed to the understorey, not the overstorey. All other stands revert to the same cover group at age zero and start to grow.

The following 'switch' stands are recognized in SYU R12: Overstorey pure 'D' stands with a crown closure of 'A' and an understorey of greater than 'A' crown closure and a valid understorey cover group of C, CD or DC.

During operations, planned protection should target a retention of 50% undamaged conifer stems as compared to the pre-harvest conditions. Acceptable stems are greater than 2 metres in height at the time of harvest have 50% or more live crown, and show good health and vigor.

² Analysis of Regenerated Cutblock Data, Weyerhaeuser Canada (Drayton Valley). July 10, 2000.



6.1.7.2 Avoidance Protection

Avoidance protection will occur in all other stands not identified as requiring 'planned' protection. Operator awareness will be the main tactic used to avoid damage to conifer understorey. Understorey protection success will be measured during the normal establishment survey procedure. No pre-survey work is required.

6.1.8 Transition Assumption for Regenerating Stands

The sustainable harvest level set in this plan is based on the assumption that harvested stands will regenerate to prescribed density and composition after harvest. The transition assumptions for regenerating stands are as follows:

- ◆ Pre-harvest stands with an A, B, C or D density will regenerate to a C density post harvest. The C density regeneration objective is assumed to align with the 80% stocking target in the regeneration standards.
- ◆ Regenerating stands are assumed to have the same broad cover group composition as the pre-harvest stand overstorey. C, CD, DC and D regeneration standards are assumed to align respectively with C, CD, DC, and D broad cover group compositions
- ◆ An exception to regeneration stand composition assumptions is where the understorey composition is used to determine the species of primary management. In this case, the regenerating stand is assumed to have the same composition as the understorey broad cover group.

6.1.9 Silviculture

The Forest Management Agreement gives Weyerhaeuser the right to grow timber and carry out reforestation programs. The agreement also requires Weyerhaeuser to progressively reforest all land cut over by the Company. In addition, a goal of this management plan is to increase the sustainable harvest level of deciduous and coniferous timber from the SYU Area. These rights, responsibilities, and goals are supported by a set of regeneration assumptions, silviculture strategies, and reforestation standards.



The provincial regeneration standards (C, CD, DC, D) will be used to evaluate the performance of regenerating harvest areas until alternative regeneration standards (see Chapter 6, Section 8.8) are developed and approved that specifically link regeneration standards to yield stratum.



To use resources efficiently while maintaining relative proportions of coniferous, mixedwood, and deciduous stands, certain factors should contribute to reforestation decisions. These considerations include, but are not limited to:

- ◆ Site suitability and stand condition
- ◆ Declining deciduous stand condition and associated low natural regeneration potential
- ◆ Residual immature coniferous trees
- ◆ Regenerating stand stocking and condition

To effectively integrate these considerations into the operational decision making process while supporting the assumptions of future forest composition, an exchange of areas between different stand type stratum following Provincial Policy may be considered. There are not anticipated to be any major shifts in leading species across the landscape resulting from the implementation of the silviculture strategies described in Appendix 6-1.

To sustain the productivity of the forest growing stock, a strategy of prompt regeneration will be used. Planning regeneration activities prior to harvest and scheduling treatments as soon as logistically feasible after harvest will facilitate prompt regeneration. Planting and natural seeding will be used to establish coniferous seedlings. Where planting of coniferous seedlings is used to regenerate C, CD, and DC openings, a target of 1400, 1000, and 800 stems per hectare (SPH) will be used in prescribing planting density. For C stratum openings 1400 SPH is deemed adequate to meet the associated regeneration standard while accounting for normal levels of mortality. Where higher levels of mortality area suspected after planting, openings will be monitored to support early detection and remedial action. Distribution of seedlings for CD and DC openings can be either an even distribution of 1000 and 800 SPH respectively or concentrating higher density planting of an area proportionally less than the entire block. A typical application of this would be to plant the road and decking areas of a DC block at 1400 SPH to the extent that 60 percent of the block is planted. This equates to an average planting density of 840 SPH, which corresponds, with the guidelines of a target of 800 SPH.

When establishing a planting target density for specific openings, factors of pre-harvest understorey or post-harvest advanced regeneration and ingress potential will be considered. Ingress potential will be evaluated based on seed source and seedbed conditions. Target planting densities may be adjusted for specific site conditions in recognition of these factors. Adjusted planting densities will be presented in the Silviculture Annual Operating Plan.

All regenerating stands will pass an establishment standard. If an opening does not pass the establishment standard then one or more of the following tactics will be employed to address the failed status.

- ◆ Re-treat using combinations of site preparation, planting, or tending,
- ◆ Leave stands to grow where height performance is the cause for failure, and
- ◆ Change the opening stratum declaration.



Balsam fir and alpine fir are considered an acceptable crop tree for coniferous species. Fir species constitute a part of the inventory and their presence is incorporated in the development of yield curves. Merchantable fir is utilized as a component of the coniferous harvest. Where understorey fir exists in an opening it is often retained to provide value in aesthetics, habitat, structure, and fiber production.

The primary harvesting system used is patch cutting with variable retention, with subsequent reforestation activities to provide for a sustainable timber harvesting landbase. Patch cutting involves the removal of a majority of merchantable stems from the harvest area. As part of this harvesting system Weyerhaeuser will be employing the Stand Level Ecological Guidelines that provide for both vertical and horizontal structure to be left on the harvest area.

6.1.10 Incidental Coniferous and Deciduous Timber Replacement Strategies on the FMA

The DFMP incorporates strategies within the Timber Supply Analysis that will account for incidental components upon the SYU, as well as the primary species supporting both the deciduous and coniferous Annual Allowable Cuts.

Silviculture activities will be undertaken that contribute to the sustainability of the incidental components of the stands. These activities will be applied at various levels and will include:

- ◆ Establishment of coniferous trees on new harvest areas that do not support deciduous regeneration, most notably on roads and non-satisfactorily restocked areas
- ◆ Avoidance of coniferous understorey during logging operations in predominately deciduous areas
- ◆ Protection of some of the deciduous component in regenerating stands when tending coniferous harvest areas

Review of establishment and performance survey results of pure 'C' and 'D' declared blocks will occur periodically to document the incidental replacement strategy effectiveness.

6.1.11 Potentially Productive Area

Potentially productive landbase has been identified during the landbase netdown process. Over the next several years, these areas will be visited on the ground in an attempt to classify them prior to the next DFMP, as either productive or non-productive forest landbase.

6.1.12 Periodic and Quadrant Reconciliation Volumes

With this submission of the DFMP being close to the end of cut-control period (2000/01-2006), it is intended that all operators will carry forward all approved but unharvested volumes into the next cut-control period. The volumes will be harvested from blocks already approved in the SHS. Actual SRD approved carryover volumes will be determined during SRD audits that will be completed after the end of this cut-control period.



Weyerhaeuser is to be issued a Coniferous Timber Quota (CTQ) certificate and a Deciduous Timber Allocation (DTA) certificate upon approval of the DFMP. This will allow Weyerhaeuser access to volumes outside of the FMA but within the SYU (i.e. on grazing dispositions and in old FMU R1). The volumes sequenced in period one (2000-2005) of the SHS will be harvested with the volume sequenced in period two (2005-2010).

6.1.13 Cut Control Period Designation

The cut control periods for Weyerhaeuser have been changed to the following:

- ◆ Period four - November 18th, 2000 to April 30th, 2006
- ◆ Period five – May 1st, 2006 to April 30th, 2011
- ◆ Period six – May 1st, 2011 to April 30th, 2016
- ◆ Period seven – May 1st, 2016 to April 30th, 2021
- ◆ Period eight – May 1st, 2021 to April 30th, 2026

Periodic annual allowable cut (PAAC) volumes for these periods will be derived from the approved AAC. As an example, period 4 volumes will be calculated as follows:

$AAC \times 5.449315$; where .449315 is equal to #days between Nov. 18th and April 30th divided by the number of days in an entire year, or $164/365$.

Periods 5, 6, 7 and 8 volumes will be calculated as follows:

$AAC \times 5$

6.1.14 Weyerhaeuser Non-FMA Volume Chargeability

Weyerhaeuser is to be issued a Coniferous Timber Quota (CTQ) certificate and a Deciduous Timber Allocation (DTA) certificate upon approval of the DFMP. This will allow Weyerhaeuser access to volumes outside of the FMA but within the SYU (i.e. on grazing dispositions and in old FMU R1). The volumes sequenced in period one (2000-2005) of the SHS will be harvested with the volume sequenced in period two (2005-2010).

All harvested volumes associated with the FMA, CTQ and DTA will be charged against the FMA. Each year or periodically, as agreed to with Alberta, the chargeability will be transferred from the FMA to the appropriate allocation in an amount equal to the AAC or PAAC of each.

6.2 Landscape Strategies

6.2.1 Biodiversity

In a general sense, the term “biological diversity” refers to the variety of life and the processes that support it. However, the term encompasses concepts that differ in context and scale. Biological





diversity may refer to genetic diversity within a species, to the diversity of species within communities, or to the diversity of communities across landscapes and regions. On different spatial scales, the diversity of species and communities reflects a complex set of environmental conditions (topography, climate, soil, etc.) that change over time. Forest ecosystems are complex and dynamic mosaics of vegetation patches varying 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 on smaller scales (e.g., mortality of individual trees).

Depending on site-specific environmental conditions (e.g., soil, topography, climate), plants and animal species occur in different assemblages (communities) according to the stage of succession, the time since disturbance, and the scale (i.e., extent, intensity) of that last disturbance. To some degree, species are adapted to the disturbance regime of the region they inhabit. Hence, it is widely believed that the long-term sustainability of the forest ecosystem and the ecological requirements of most species can be addressed by emulating the natural processes of disturbance and succession characteristic of a site and/or a region. Natural disturbance processes result in the maintenance of a variety of stand sizes, attributes, structures and seral stages across landscapes (*coarse filter approach*), within the range of natural variation in the system (i.e., the “*natural disturbance model*”).

In accordance with the principles espoused by the Alberta Forest Legacy and the Canadian Biodiversity Strategy, Weyerhaeuser will address concerns about the conservation of biodiversity by adopting a coarse filter approach. This requires managing forest ecosystems as a whole, recognizing their dynamic nature, the autecology and successional patterns of the major tree species, and the dependence of all biota on the presence of a variety of structures and seral stages widely distributed over a forested landscape. The coarse filter approach requires:

- a) planning and operating over large landscapes;
- b) maintaining landscape interspersion, diversity, and connectivity, and minimizing fragmentation;
- c) retaining structural diversity at the stand level; and
- d) implementing a monitoring and adaptive management strategy so that new information is gained quickly and this information results in changes to management strategies.

6.2.2 Operational Planning Considerations

Consistent with the above concepts, in its progress towards ecologically sustainable forest management practices in Alberta, Weyerhaeuser has developed operationally-based ecological guidelines. These guidelines will be integrated with timber supply analysis, operational considerations, and societal values, within the forest management planning process.

The approach to maintaining biodiversity by Weyerhaeuser is outlined in Volume 1, Appendix 2-2.



The coarse filter approach will be complemented by a fine filter component to address the habitat needs of feature species³. The fine filter approach focuses on species rare, threatened, endangered or of social value. Both the coarse filter and fine filter approaches will be integrated in Weyerhaeuser's forest management plans.

Since 1998, Weyerhaeuser has contributed or directly funded a comprehensive research and monitoring program. Research initiatives, conducted or still underway include a study on the response of bats to forest practices (University of Alberta), an assessment of amphibians occurring in the SYU (University of Alberta), an all encompassing study on the ecology and movements of elk and wolves (University of Alberta) and the Foothills Model Forest Grizzly Bear research.

These projects are complemented by the ongoing biodiversity/wildlife monitoring program. Weyerhaeuser is committed to assess trends in biodiversity indicators (change in birds⁴ and furbearers⁵ species occurrence) based on SYU wide surveys conducted every 3 years⁶. This data, and the previously mentioned specific research projects, will provide guidance on habitat needs and response to forest practices which will be integrated in harvest planning.

Overall, species' needs and the maintenance of biodiversity will be addressed through the following ecological strategies and silvicultural tools:

- a) stand retention practices (to maintain habitat elements at the stand level);
- b) old growth strategy (to maintain late seral stages components on the landscape) ;
- c) harvest patterns design (to ensure a diverse distribution of stands of different age);
- d) harvest area design (to minimize site specific impacts on wildlife);
- e) recognition of areas of special importance to plants and wildlife species;
- f) timing of operations (to minimize site specific impacts); and
- g) maintenance of fish habitat.

These strategies and tools may be tailored to species specific habitat needs as identified and agreed upon with SRD.

Where possible the "Stand Level Ecological Guidelines" will also apply to timber salvage operations such as fire, blowdown and insect/disease.

³ "Feature" species are those that are rare, threatened, endangered or of social value.

⁴ The selection of birds species (neo-tropical migrants, resident species and nocturnal raptors) as biodiversity indicators is suggested by various studies conducted across Canada by independent researchers and by researchers studying within the Sustainable Forest Management Network (*Kneeshaw et al. 2000. Towards Sustainable Forestry: A proposal for indicators of SFM Inspired by Natural Disturbance. Sustainable Forest Management Network Publication. 58 pp.*). As outlined in the report: "Forest Bird Communities represent 70% of all vertebrate forest dwelling species of fauna. Furthermore, bird species react to changes in stand conditions as well as to cumulative changes at the regional scale."

⁵ Furbearer species (American marten, fisher, weasel, etc.) are a second guild of wildlife species that will be used to monitor whether through forest management a variety of stands of different sizes and ages are maintained across the landscape. Furbearers, particularly American marten, require structural components at the stand level (e.g. woody debris) as well as a certain amount of older forest stands widely distributed.

⁶ Weyerhaeuser has initiated an independent review of the ongoing monitoring program to assess its value and application to Sustainable Forest management.



A) Stand retention

The retention of trees, snags and woody debris in harvest areas is a significant component of ecologically based forestry and is consistent with the goals, objectives and strategies outlined in the Plan.

- a) Retaining live trees within harvest areas creates harvest designs that more closely mimic post-disturbance conditions and lessen the impact of logging on ecosystem structure and function. Live trees increase the structural diversity of the regenerating stand, retain some later seral conditions such as a multi-layered canopy, provide a future supply of large snags and down logs, and increase micro-site variability for a more diverse plant understorey. They also provide ecological sites (refugia) from which unaffected plant and animal species can disperse onto the surrounding harvest area.
- b) Snags play a very important role in a functioning forest ecosystem. In addition to their value in recycling nutrients, snags provide habitat for many species of plants, invertebrates, birds and mammals. The absence of snags is a major limiting factor for cavity nesting birds, influencing their occurrence and distribution. Retention of large snags on cut-over areas can be prescribed to provide habitat for cavity nesters.
- c) Woody debris left in piles and dispersed over the block provides valuable hiding and nesting cover for a variety of small mammals.

In order to achieve or maintain stand level structural diversity, the following general principles will be followed:

- a) Safety is a primary concern and must be ensured at all times as noted in the Alberta Forest Products Association tree retention guidelines (*Residual Trees in Harvest areas Guidelines*).
- b) Effort will be made to retain some form of vertical structure in all harvest areas. The amounts will vary as site conditions and site-specific objectives allow.



Retention of structure within harvest areas is site-specific: wet sites, unmerchantable areas and understorey protection provide opportunities to retain various structural components (clumps, etc.) and contribute to stand diversity in the regenerating forest. This practice will also protect soil and sensitive sites that may harbor rare plants and small wildlife species.



Retention opportunities are available on a site-specific basis and depend on:

- ◆ preharvest stand condition;
- ◆ topography;
- ◆ identified values;
- ◆ operational and economic feasibility.

Several retention options are available for consideration by the operations planner and supervisor:

- ◆ snags;
- ◆ single green trees;
- ◆ patches varying in size, shape, species and location of unmerchantable and merchantable trees;
- ◆ coarse, down woody debris (including brush pile retention).

Merchantable retention can vary over any particular landscape to achieve an average of five (5) percent merchantable volume. The monitoring program estimates the percent of merchantable volume retained as compared to the amount of volume available for harvest at 100% removal on a block-by-block basis (Appendix 6-4).

Merchantable retention has been directly applied in the TSA as an AAC reduction of five percent.

B) Old growth strategy

Forest ecosystems are a complex mosaic of stands of different age, structure and composition, reflecting a continuous process of renewal through establishment, growth, death and re-establishment. Natural disturbance events such as fire, insects and disease, play a critical role in maintaining a balanced forest ecosystem and functioning ecological processes.

Very late seral stages (“old growth”) are an important component of forests and landscapes. They not only provide habitat for numerous “old growth”-dependent species, but their presence is considered essential to the long-term sustainability of forest ecosystems.

This section outlines Weyerhaeuser’s approach to the maintenance of “old growth” in the Drayton Valley SYU Area.

A definition of old growth

There is no widespread agreement on what constitutes “old growth” forest. Peterson et al ⁷ listed 26 different definitions from different authors and geographic areas. In general, all definitions refer to “old growth” as being a unique successional stage in the life of a plant community, where the structural and compositional features support specific “old growth” ecological processes.

⁷ Peterson, E.B., N.M. Peterson and K.A. Enns. 1995. Guidelines for old forest management in Elk Island, Jasper, Yoho, Kootenay, Banff, and Waterton Lakes National Park. Prepared for Canadian Heritage, Parks Canada, Alberta region. 78pp.



The State of Canada's Environment classified "old growth" forests where trees are 140 years or older⁸. This contrasts with the 275-300 year range for coniferous forests referred to by Achuff⁹ for Canada's five Rocky Mountain National Parks. In the United States, the Forest Service has characterized old growth as "*later stage(s) in forest development which may be distinctive in composition but are always distinctive in structure from earlier (young and mature) successional stages*"¹⁰. However, Hunter and White¹¹, after an extensive review of numerous studies on forest ecology and development, concluded that there is no evidence of the existence of distinct thresholds between what might be called a mature forest and "old growth." According to Hunter and White (1977), forest succession and development is a continuum of changes in structure and composition where no specific age can provide an "*unambiguous threshold on which to base a definition.*"

The absence of an age where "mature forest" can be distinguished from old growth does not imply that older stands are similar to younger ones or that older stands do not provide important ecological and wildlife values due to unique structural and compositional characteristics. On the contrary, the absence of a discrete age for distinguishing between mature forest and "old growth" suggests that managers need to identify the characteristics that make older stands valuable and to manage for this ecological uniqueness. The work of Hunter and White would also suggest that these unique characteristics will vary by ecosystem and at times ecosites. To date, there are no templates that can be used in all situations. Further, "old-growth" attributes that provide ecological and social values may be reached at different ages depending on the:

- site-specific ecology of the forest stand;
- successional stage and disturbance history;
- structural and compositional characteristics;
- relative contribution to the forest landscape;
- the relative rarity of this stage of development.

The quality of the growing space (Site Index) is also an important factor because trees grow larger, faster on better sites. The management of late seral stages may depend on their specific degree of structural diversity, on what Spies and Franklin¹² called an index of "old-growthness." However, many of the preceding considerations also apply to all other successional stages.

DFMP approach

Fire is a natural abiotic factor that has played an important function in the development of the forest ecosystem in the Drayton Valley SYU (see Chapter 1, Section 1.2.4.1 *Natural Disturbance Patterns*). Fires have been important in maintaining the diversity and vigor of the forested foothills, as they have in many other regions of Alberta¹³.

⁸ Watson, B.G. 1993. Canadian Views on old growth forests. *Forestry on the Hill Spec. Issue 5*: 1-2

⁹ Achuff, P.L. 1989 Old Growth forests of the Canadian Rocky Mountain National Parks. *Nat. Areas J.* 9(1): 12-26

¹⁰ Moir, W.H. 1992. Ecological concepts in old-growth forest definition. In: *Old-growth forests in the Southwest and Rocky Mountain regions*, Proc. of a workshop, Portal, Arizona, USDA General Tech. Rep. RM-213. pp.18-23.

¹¹ Hunter, M.L. Jr. and A.S. White. 1997. Ecological thresholds and the definition of old-growth forest stands. *Natural Areas Journal* 17(4): 292-296.

¹² Spies, T.A. and J.F. Franklin. 1988. Old growth and forest dynamics in the Douglas-fir region of western Oregon and Washington. *Natural Areas Journal* 8(3): 190-201.

¹³ Kelsall, J.P., E.S. Telfer and T.D. Wright. 1977. The effects of fire on the ecology of the Boreal Forest, with particular reference to the Canadian north: a review and selected bibliography. *Can. Wildl. Serv. Occasional Paper* 32.



Young forests, almost all of which are the results of past fires, are characterized by thick stands of small lodgepole pine or aspen, depending on the site. These stands support a large number of wildlife and plant species. Very late conifer stands (121 to 170 years) occur on sites that have escaped recent forest fires and are usually dominated by long-lived and large white spruce and fir, with a sparse, well-shaded understory. These stands may contain organisms native to this geographic area but which are found nowhere else due to the characteristics of these stands. More importantly, these organisms may contribute significantly to the overall biodiversity of the region and, further, they may be important to the ecological maintenance of these ecosystems.

Because fire is an important factor in boreal forest ecosystems, an age-class distribution similar to the one that results from periodic burning is an essential feature of forest management. In that context, Weyerhaeuser will work toward achieving a forest age distribution similar to what would occur under more natural conditions, and by means of this distribution will attempt to achieve a more desirable balance between environmental, economic, and social values.

Restoring a pre-1900 age-class distribution would produce a forest where most stands would be very young. The reduction in the abundance of older-aged stands would potentially reduce the diversity of wildlife species dependent on late seral stage forest. However, an age-class distribution, such as the one dominant today, results in large expanses of forest reaching old age with an increased risk of fire, insect infestation or disease outbreak. The aging forests also limits availability of early seral stages and, hence, the habitat for wildlife species that depend on those stages.

In planning for future forest landscapes, Weyerhaeuser will attempt to maintain a range of age structures consistent with the inherent ecological processes characteristic of each natural subregion. These natural subregion-specific age structures will determine the percentage of forest in late to very late seral stages that will be maintained over the planning horizon.

The amount and distribution of older seral stages (see Chapter 1 – Section 1.2.3.1 *Age Class and Seral Stage Distribution*) are highly influenced by topography and climate, which influence landscape burning patterns (¹⁴ and ¹⁵). The amount and distribution will likely vary, depending on elevation, aspect, slope and soil moisture. Generally, late seral stages are more likely to be found on sites with higher levels of soil moisture; such as on northwest, north-northeast and east facing slopes. South and southwest facing slopes and well-drained sites have the highest chance of being burned. Hence, these sites burn more frequently and are the least likely to support older forest stands ¹⁶.

While the amount of forest retained in older seral stages is important, its spatial distribution in relation to younger forest stands and its occurrence in a variety of patch sizes over the landscape are critical. Weyerhaeuser will maintain in each Landscape Management Unit a wide range of patch sizes of older seral stages, including a number

¹⁴ Andison, D.W. 1997. Landscape fire behaviour patterns in the Foothills Model Forest. Foothills Model Forest Report. Hinton, Alberta. 63 pp.

¹⁵ Feunekes, U, Rogeau, M.P. and White, C.A. 1993. A fire growth model for the Central Rockies Ecosystem. Pages 47-59 in C.A. White and P.L. Achuff, tech coords. Proc. Of the Central Rockies ecosystem interagency fire management workshop, Feb. 23-25, 1993, Lake Louise, Alberta. Parks Canada, Banff, Alberta.

¹⁶ White, C.A. 1985. Wildland fires in Banff National Park, 1880-1980. Parks Can., Nat. Parks Br., Ottawa, Ontario. Occasional Paper # 3



of patches of size sufficient (~ 125 ha) to provide interior forest characteristics.

Amount of forest in late, very late and overmature seral stages

In 1999, Weyerhaeuser made an attempt to characterize the natural fire regime of the Drayton Valley Forest Management Agreement Area. The research initiative conducted by Dr. Glen Armstrong of the Department of Renewable Resources at the University of Alberta concluded that *“it appears that a significant number of the natural disturbance events that occur in the foothills natural region are of a size comparable to the FMA. Because of this, it may be extremely difficult to achieve landscape level goals on a landbase as small as the Drayton Valley FMA.”* Table 6-3 describes the late seral stages used in the SYU.

Table 6-3 BCG by Age Definitions for Late Seral Stages

Broad Cover Groups	Seral Stage (≥) (years)		
	Late (L)	Very Late (VL)	Over mature (OM)
Dec	71	111	---
DC	71	111	---
CD	91	121	171
Pine (PI)	91	121	171
CX	91	121	171
Spruce/Pine (Sw/PI)	91	121	171
Spruce (Sw)	91	121	171

In the absence of a full understanding of natural fire regimes in the region, and without an agreed upon definition of “old growth”, Weyerhaeuser will ensure that a certain amount of forest older than “rotation age” will always be present within the Drayton Valley SYU. In addition to the amount retained past rotation age, Weyerhaeuser will ensure that a percentage of past rotation forest will be in **very late seral stage** condition (>111 and 121 years for deciduous and conifer dominated forests, respectively). Late and very late seral forests will be maintained within each natural subregion to accommodate plant and wildlife species dependent on these older forest types.

A research project completed in February 2001, indicates that the age of onset of structural characteristics typical of old-growth conditions in the Upper Foothills and Subalpine ecoregions of west-central Alberta is variable, but appears to occur between 160 and 180 years¹⁷. As a result of that research, Weyerhaeuser will identify the location of stands 170 years of age and older. Based on their current amount within each Subregion, an initial amount will be retained while additional research will be conducted to assess their biological and ecological value.

The following minimum area requirements reflect ecological requirements at the natural subregion level. (Table 6-4) The amounts were derived from analysis of the current age class distribution, a coarse level assessment of historical trends, and natural disturbance patterns of each natural subregion. In addition to these minimum amounts, Weyerhaeuser will avoid harvesting rare old stands as they are identified during the operational planning stage. Furthermore, current Weyerhaeuser practices to retain stand

¹⁷ Morgantini, L.E. and J.L. Kansas. 2003. Differentiating mature and old-growth forests in the Upper Foothills and Subalpine Subregions of west-central Alberta. The Forestry Chronicle. 79(3): 602-612.



level structure in harvest areas will provide structural diversity in regenerating forests and create some old forest structures throughout the rotation. Similarly, residual patches of >0.5 ha should retain some old forest characteristics in harvest areas immediately after harvest, while smaller patches and single residual trees may create old forest structures late in rotation ¹⁸.

Table 6-4 BCG by Landbase Constraints Applied in the TSA

Broad Cover Groups	Landbase Constraints (% of total BCG that must be maintained over time)								
	Lower Foothills			Upper Foothills			Sub Alpine		
	L (%)	VL (%)	OM (%)	L (%)	VL (%)	OM (%)	L (%)	VL (%)	OM (%)
Dec	5	1	---	5	2	---	---	---	---
DC	5	1	---	5	2	---	---	---	---
CD	5	1	---	5	2	---	---	---	---
Pine (PI)	5	1	---	2	1	0.5	5	2	1
CX	5	1	---	10	5	2.5	10	5	2.5
Spruce/Pine (Sw/PI)	5	1	---	10	5	2.5	10	7.5	5
Spruce (Sw)	10	2	---	15	5	2.5	20	10	5

In the Lower Foothills natural subregion, minimum retention levels will be 5% of the late seral class, of which 1% is in very late seral stage (>120 years). This retention level will apply to all plant species associations except white spruce and lodgepole pine. This is because pure white spruce usually only occurs in the older seral stages (in the younger stages it occurs mainly in mixedwood stands). The minimum retention levels for pure white spruce are increased to 10% for the late seral stage of which 2% is in very late seral stage (>120 years). In contrast, lodgepole pine stands are usually of a fire origin and stands older than 90 years are unlikely to remain on a landscape for a significant length of time. For that reason, minimum retention amount for lodgepole pine is 1%.

In the Upper Foothills, the minimum levels of late seral stages are higher, thus reflecting the naturally longer fire cycle, and higher probability that older stands remain in the landscape for longer periods. In this Subregion, minimum retention levels are as follow: for deciduous and mixed wood stands, 5% of the late seral stage (>70 and 90 years, respectively), of which 2% will be in the very late seral stage (>110 and 120 years respectively); for lodgepole pine forests, 2% of the late seral stage (>90 years), of which 1% will be in the very late seral stage (>120 years) and 0.5% will be overmature. The minimum retention for lodgepole pine-white spruce forests increased to 10% for the late seral class (>90), to 5% for the very late seral class (>120) and 2.5% for overmature reflecting successional trajectory from pine to spruce dominated forests. The minimum retention for white spruce (or Engelmann spruce) is increased to 15% for the late seral class, 5% for the very late seral class and 2.5% for the overmature class.

The Subalpine natural subregion is known to experience less frequent, but more catastrophic, fire events. In this natural subregion, older stands have a higher probability of remaining on the landscape for longer periods than in the other natural subregions. The Subalpine natural subregion has a longer fire cycle reflecting a generally cooler, wetter climate, and less lightning activity. Consistent with this natural pattern, in the

¹⁸ Schieck, Jim. Provincial Biodiversity Specialist Resource Conservation & Planning Branch Fisheries and Wildlife Management Division, Natural Resource Service, Edmonton. September 27, 2000, letter to Jim Allen, Wildlife Biologist, Rocky Mountain House regarding Weyerhaeuser Old Growth Strategy.



Subalpine, Weyerhaeuser will maintain greater amounts of late seral stages as follows: minimum retention for lodgepole pine forests will be 5% of which 2% will be in the very late seral stage (>120 years) and 1% will be overmature. The minimum retention for lodgepole pine-white spruce forests remains at 10% for the late seral class (>90), 7.5% for the very late seral class (>120) and 5% for the overmature seral class reflecting successional trajectory from pine to spruce dominated forests. However, the minimum retention for Engelmann spruce (or white spruce) is increased to 20% for the late seral class (>90 years), to 10% for the very late seral class (>120 years) and 5% for the overmature class.

C) Harvest patterns

To maintain forest diversity at the stand and landscape level, Weyerhaeuser has employed the following techniques in the TSA to establish the harvest pattern across the SYU Area:

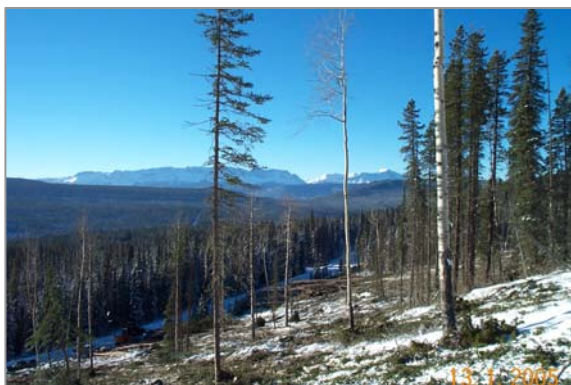
- ◆ multiple pass harvesting at the landscape level;
- ◆ a forest stand-replacing silviculture system (patch cut with variable retention);
- ◆ dispersed logging by sequencing stands across the SYU;
- ◆ identification and protection of unique habitat types;
- ◆ maintenance of late, very late and overmature seral stages, and
- ◆ a wide range of block sizes and shapes.

The Timber Harvest Landbase (THLB) has been identified through the process described in **Volume II, Appendix 4-1, (Defining the Net Harvestable Landbase)**. Eligible stands from the THLB are spatially sequenced for harvest in the TSA.

The number of harvest areas, their distribution over the landscape and the amount of timber harvested in an area may vary to meet the needs of interior habitat species for large areas of unfragmented forest, to conserve biodiversity, ensure ecological sustainability, and to meet the needs of key wildlife species.

D) Harvest area design at the Operational Planning Stage

The design of harvest areas is another primary tool to conserve biodiversity and protect wildlife, their habitat and the landbase in general. Harvest areas are designed to follow natural terrain features and contours as well as timber type boundaries. This benefits wildlife by maintaining the natural edges as well as adjacent protective cover and by minimizing watershed damage, blowdown and aesthetic impacts.



Harvest area shapes result from the design and operations directly associated with the approved spatial harvest sequence. The boundary of the forest stands primarily defines the shape of the harvest area. Terrain features, access, water source areas and stand structure are all taken into account. Fish and wildlife values are also considered in the final design and operations.



The dimensions and shapes of harvest areas will vary. Irregular block shapes are preferred because they minimize lines of sight. The range of size of harvest areas will vary depending on their irregular shapes and on the number of patches of timber left as cover for wildlife. The key objective in design is to ensure sufficient contiguous protective cover and use of the regenerated area.

Harvest area design will also attempt to erase existing harvest patterns (i.e. checkerboard designs) and combine small blocks.

E) Recognition of areas of special importance to plants and wildlife species

In a forest ecosystem, many unique sites can host rare plant communities and/or species and provide habitat for small mammals, birds, amphibians, reptiles, and invertebrate species. When these sites (e.g., nest sites of raptors or other species such as heron) are identified, they will be integrated into forest management planning (see Chapter 1, Section 1.2.7 *Ecological and Historical Resources* for process on identifying, recording and tracking these finds).

Retention of standing timber will be prescribed for important wildlife habitat areas such as:

- a) key wildlife travel corridors; and
- b) key wildlife ranges.

The size and location will be governed by the need to provide protective cover and minimize disturbance.

The Integrated Resource Plans for the SYU Area have also zoned areas within the Blackstone and Marshybank LMUs for Prime Protection. These areas are situated along high elevation forest and bare rock of the Bighorn Range. Weyerhaeuser has excluded these areas from the timber harvesting landbase.

F) Timing of operations

i. Ungulate winter range

On key ungulate winter ranges, operations are preferably scheduled for summer, late fall or early winter to avoid disturbing animals during critical periods when energy reserves are low. Area timing restrictions are outlined on the "Fish and Wildlife Division Referral Map for Geophysical Programs in the Rocky Clearwater Forest, February, 1990" or revisions.

If unavoidable, these areas will be operated through means that would:

- a) Compress the period of activity to reduce impacts on wildlife.
- b) Harvesting operations within such areas at any one time may be minimized to allow ungulates access to escape terrain and to provide continuing secure habitat.
- c) Harvesting operations should occur as early in the winter as possible.

ii. Breeding bird habitat

To avoid impacts on most bird species, harvesting should avoid the period April 1st to July 31st. The intent is to allow birds to reach the fledging stage, thereby increasing their capacity to move away from any disturbance. If this is not possible, the following will be



done to minimize impacts on nesting birds:

1. minimize the amount of harvesting during this period to as small as possible,
2. harvest as late as possible in this period,
3. delay harvesting in pure deciduous and mixedwood stands as much as possible; this would avoid the areas with the highest nesting activity, and
4. prioritize pure conifer stands, with preference of logging spruce before pine.

G) Fish habitat

Fish habitat is protected by minimizing stream siltation and providing continued flow throughout the year on permanent watercourses that may be used by fish at various times in their life cycle. Increased sediment load in the water may interfere with growth of aquatic plants and small invertebrates that provide cover and food for fish. Once settled, sediment can smother fish eggs on spawning beds and change groundwater flow patterns that affect availability of oxygen over the winter. Suspended sediment can also irritate the respiratory system of fish and make them susceptible to disease. Fish will change their movements to avoid sediment plumes and this may interfere with emergence, rearing, and migration

There are also many other factors that affect fish habitat such as water temperature modifications, nutrient inputs, stream bank stability, overhead tree cover and in stream large woody debris. Harvest operations influence these factors to a lesser extent or not at all.



As outlined in Chapter 1, Section 1.2.6.1 Weyerhaeuser has a number of watershed strategies to be implemented during timber harvesting and road construction to minimize the potential for damage to fish habitat. The Company will continue to work with other agencies (e.g. Alberta Conservation Association) to assess and gather fisheries data for the watercourses on the SYU Area.

6.2.3 Grizzly Bear

The grizzly bear (*Ursus arctos*) is classified as 'may be at risk' in Alberta and as a species of 'special concern' by COSEWIC (Committee on the Status of Endangered Wildlife in Canada). The province is currently (June 2005) reviewing a draft version of the Grizzly Bears Recovery Plan. Included in the recovery plan are draft versions of the 'habitat' and 'mortality risk' maps. These maps have been made available to any interested parties. While these maps do not however cover all of the affected grizzly bear areas in the Province, they do cover portions of the Pembina FMA's. Weyerhaeuser is committed to using the habitat maps as developed.



Due to their nature, the habitat and mortality risk maps, based on Resource Selection Functions models, cannot be applied at a strategic level and hence were not used during the development of the Pembina (Edson and Drayton Valley) DFMPs. The maps will be used as operational tools to adjust harvest designs (e.g. cutblock shape and size) and road alignment, consistent with the location of Grizzly Conservation Areas (GCAs). Draft guidelines for habitat, access and intense human activity management have been created for areas both inside and outside of Grizzly Conservation Areas (GCAs), as follows:

Habitat Management

Inside the GCAs, reclamation will consider grizzly forage plant preference where appropriate. Re-vegetation and reclamation activities, with the exception of temporary in-block roads that are to be reforested in concert with their harvest areas, will consider grizzly forage plant preference where appropriate. Outside of the CGA, companies will consider similar re-vegetation strategies.

Access Planning

The development of permanent roads require coordination between all operators within a GCA. Use existing access whenever available and practical. Alternatives to all-weather roads will be pursued, with such things as winter or temporary roads. Forest planners will follow targets for open-road densities that have been set at 0.6 km/km², with the intent to limit road densities to remain below these thresholds.

Inside GCAs, when developing road corridors, all opportunities will be taken to avoid quality habitat without compromising environmental standards. If roads must be built within the areas of high quality, then mitigating factors will be pursued. Activities would include restricting access, temporary roads, or timing constraints.

In areas outside of the GCA, the preference will be for use of existing roads, winter access, temporary roads and other alternatives to all-weather roads. If long-term access is required, coordinated plans will be developed to meet the guidelines. Targets for open-road densities have been set at 1.2 km/km².

In areas outside of the GCAs, road corridors will attempt to avoid high quality habitat. If unavoidable, then mitigating factors will be required, including some or all of the following: low traffic volumes, temporary roads, timing activities, etc.

Season of Harvest

Within the GCA, winter is the preferred season of harvest. If non-winter operations are unavoidable, operating in areas of expected high bear use, such as valley bottoms during the spring, will be avoided. For areas outside of the GCA, winter is also preferable to summer operations.



6.3 Access Management

Access management is one of the most contentious issues facing Alberta's natural resource managers today. Vehicular access created by the energy and forestry sectors can have profound impacts on watersheds and on fish and wildlife. Conversely, some members of the general public do not readily accept policies or regulations on access restrictions to Crown land.



Roads and access management was also a key issue identified in Weyerhaeuser's public involvement program for this DFMP. Many individuals and interest groups identified the need to reduce or minimize access in recognition of the needs of wildlife, tourism and recreation. As well, many thought Weyerhaeuser should take a leading role in managing access because of the scope of its long term planning. This view contrasts, however, with the fact that the Company has generally little control or influence over access development by others. Similarly, the Local Coordinating Committees for the two Special Places nominations within the SYU Area heard the need to address the conflict between all-terrain vehicle use and environmental protection.

Because of the existing infrastructure, Weyerhaeuser rarely has the need to develop any main or major access roads. Most of the Company's permanent roads are Class 3 or lower in standard. The vast majority of roads are temporary and are used to log and haul out in the same season. These roads are promptly reforested the following year and abandoned. In recent years, there have been examples of joint road development and management by Weyerhaeuser in partnership with other companies. In addition, Weyerhaeuser has contributed to the upgrading of the Sunchild Road in partnership with the local Municipal Districts.

As of the summer of 2004, Weyerhaeuser has four roads with locked gates for access control. In each situation, it is a condition of the License of Occupation to minimize disturbance pressures on wildlife and to protect the roads from damage as a result of public use during periods of inclement weather. However, gates are not seen favorably by some and are frequently vandalized.

In an effort to manage access issues created by Weyerhaeuser's forest management activities the Company will:

- ◆ continue to utilize existing road development whenever possible. This would include the take over of abandoned routes, partnerships in future road development and the use of common corridors.
- ◆ continue the use of access control measures such as gates or temporary abandonment where warranted. Important to public acceptance of gates is proactive communications on the need for such measures. This would include signs and other information tools.



- ◆ continue prompt abandonment of short-term roads including access control measures.
- ◆ integrate trail management objectives with harvest planning in coordination with the PLFD.
- ◆ follow the Chungo ILM Plan.

Participants in Weyerhaeuser's public consultation for this DFMP noted special concerns about increased access to areas west of the Forestry Trunk Road, particularly next to Jasper National Park. This area has few roads now, but development is expected to occur from the energy sector. Weyerhaeuser has engaged such a process already for another location on the SYU Area, which led to the development of the Nordegg River Area Access Management Plan.

6.4 Watersheds

6.4.1 Watershed Analysis

Weyerhaeuser has developed an internal process to report, and if required, analyze FMA watersheds for possible hydrologic issues. The objective of the process is to limit any unintended effects that forestry activities would have on the yield of water from the watershed.



6.4.1.1 Process

Step #1.

All fourth-order watersheds will be reviewed to determine if more than 40% of the total watershed area is less than:

- a) 35 years of age for predominantly conifer/conifer mixedwood stands, or
- b) 20 years of age for predominantly deciduous/deciduous mixedwood stands.

These ages are considered the age at which such stands are at hydrologic recovery.

Table 6-5 describes the results of the review for the Unit. Additional information can be found in Appendix 6-5.

Step #2.

If yes, then the watershed will first be analyzed using a model called the "Effective Clear-cut Area" (ECA) model, developed by Dr. Uldis Silns at the University of Alberta. The model simulates the cumulative effects of timber harvest and timber growth over time, on water yield from a watershed.

Step #3.

If the result of this analysis indicates that water yield will increase by more than 20%, then either the harvest plan will be modified, or, a further analysis will be conducted.



Table 6-5 Areas Used to Determine Impacts on Water Yields Within a Fourth-order Watershed Upon the SYU (Step #1).

Watershed Name	1 Total Watershed Area (ha)	2 Harvest Area (ha) (Table 6B)	3 Burned Area (ha) (Table 6C)	4 Spatial Harvest Sequence (ha) (Table 6D)	5 Total Area (ha) (2+3+4)	Estimated % Forested Area as defined in Step #1 (((2+3+4)/1)	Code
Baptiste	47,646	6,190	4,652	4,260	15,102	31.7	B
Big Beaver	4,390	185	0	577	762	17.4	B
Blackstone	10,762	0	0	1,388	1,388	12.9	B
Blanchard	4,167	10	0	408	418	10.0	B
Brazeau	22,166	695	0	3,518	4,213	19.0	B
Brewster	6,617	235	0	1,082	1,317	19.9	B
Broken Arm	3,398	0	0	862	862	25.4	B
Brown	1,230	29	0	1	30	2.5	B
Chambers	11,408	1,131	0	1,565	2,696	23.6	B
Chief	2,029	537	357	0	894	44.1	C
Colt	1,652	0	0	328	328	19.9	B
Dismal	18,337	1,215	0	1,260	2,475	13.5	B
East Lobstick	408	21	0	0	21	5.1	A
East Pembina	12,078	203	0	1,718	1,921	12.0	B
Elk	4,282	412	0	435	847	19.8	B
Goff	8	0	0	1	1	14.9	A
Gonika	23	6	0	0	6	23.8	A
Grey Owl	3,931	20	0	79	99	2.5	B
Hansen	1,407	0	0	161	161	11.4	B
Haven	71	8	0	0	8	11.8	A
Horseshoe	1,372	0	0	94	94	6.9	B
Lookout	5,576	50	0	762	812	14.6	B
Lower Brown	8	0	0	1	1	17.9	A
Lower Chungo	8	0	0	1	1	7.9	A
Marshybank	1,072	12	0	0	12	1.1	B
McCormick	4	0	0	0	0	0.0	A
Middle Colt	4	0	0	0	0	4.7	A
Mink	1,864	0	0	176	176	9.4	B
Negraiff	30,907	2,710	0	2,300	5,010	16.2	B
Nordegg	53,323	7,495	26	4,214	11,735	22.0	B
North Saskatchewan	65,516	3,088	139	5,958	9,185	14.0	B
Opabin	13	0	0	0	0	0.0	A
Open	7,040	4	0	265	269	3.8	B
Pembina	8,583	1,106	0	766	1,872	21.8	B
Penti	4,104	0	0	292	292	7.1	B
Rapid	5,490	21	0	382	403	7.3	B
Rehn	2,159	133	0	687	820	38.0	B
Rundell	18,160	1,561	0	2,415	3,976	21.9	B
Ryhannan	1,188	13	0	257	270	22.7	B
Sand	27,857	3,348	0	5,608	8,956	32.2	B
Shankland	17	0	0	0	0	0.0	A
Shunda	17	0	0	0	0	0.0	A
Slater	9,948	444	0	811	1,255	12.6	B
Smith	34	0	0	0	0	0.0	A
South Chungo	7	0	0	1	1	0.0	A
Stevens	4,939	12	0	825	837	17.0	B
Sturrock	5,520	250	0	258	508	9.2	B
Sutherland	1,145	0	0	111	111	9.7	B
Tallpine	21,255	1,250	0	1,719	3,1	14.0	B
Upper Blackstone	24	0	0	0	0	0.0	A
Upper Chungo	7	0	0	0	0	6.6	A
Upper Colt	0	0	0	0	0	0.0	A
Upper Saskatchewan	1	0	0	0	0	13.7	A
Wapiabi	5,974	0	0	242	242	4.1	B
Wawa	9,665	17	0	1,929	1,946	20.1	B
Welch	865	22	0	0	22	2.5	A
Wilson	8,770	0	0	152	152	1.7	B
Wolf North	808	53	0	0	53	16.5	A
Wolf South	31,317	2,185	0	1,827	4,012	12.8	B
GRAND TOTAL	490,571	34,671	5,174	49,696	89,540		

Codes:

A: Less than 10% of watersheds total area is within the boundaries of the SYU R12; no other analyses required

B: Less than 40% of watersheds total area is less than the threshold age limit; no other analyses required

C: At least 40% of watersheds total area is above the threshold age limit; proceed to step #2

**Step #4.**

This second analysis will be done using the Water Resource Evaluation of Non-Point Silvicultural Sources (WRENSS) model. WRENSS examines more variables than ECA, and is expected to provide a more detailed analysis. A WRENSS analysis provides estimates of potential changes to annual water yield, peak flows for a range of different return periods (i.e. 2 yr - 100 yr events) and estimates of ECA based on basal area recovery and water yield recovery. Evaluation of these parameters will help minimize the hydrologic effects of forest harvesting.

A threshold of 20% is used as an “acceptable increase” in annual water yield and peak flow for return periods of 3-4 years based on analysis of the variability of flows¹⁹ obtained from a statistical analysis of flows in the Grande Cache-Grande Prairie region. Based on existing research these limits are considered to be conservative in providing protection to downstream users and aquatic habitat. However, further research is needed to confirm and define the effects and linkages between changes in flow and aquatic habitats.

Step #5.

If WRENSS analysis indicates water yield increases are still greater than 20%, then harvest plans will be modified.

6.4.1.2 Process Improvement

Currently, most precipitation and flow input data for the models above, comes from major watersheds in the Province. Weyerhaeuser has implemented a Small Watershed Assessment Program (SWAP) using sites on all three Alberta FMAs.

The purpose of the study is to better understand the hydrology of smaller streams. The sites compare hydrological variables in both harvested and non-harvested watersheds over time on typical small streams.

The data collected will be used to refine the models to more closely reflect actual conditions during the analysis process.

6.5 Integrating Timber Operations

Weyerhaeuser shares the timber resources on the SYU Area with Tall Pine Timber Co. Ltd. of Lodgepole, Dale Hansen Ltd. and with two programs administered by the Public Lands and Forests Division: the Lodgepole CTP and the Local Timber Permit program. Weyerhaeuser aims to meet the DFMP goal to **integrate with the management activities of other resource users** by working cooperatively with these other timber operators. Continued sharing of information and exchange of best practices related to harvesting and silviculture methods will ensure continuous improvement.

¹⁹ “Variability of Precipitation and Streamflow, Grande-Cache – Grande Prairie and Discussion of Guidelines for Water Yield and Peak Flow Increases, Prepared for Weyerhaeuser Canada by Watertight Solutions Ltd. Edmonton, March 2005.



To achieve sustainable production of timber and integrate other resource values for the SYU Area, the area needs to be managed as a Sustained Yield Unit (R12). Weyerhaeuser has consulted Tall Pine Timber Co. Ltd. and the Local Advisory Committee of the Lodgepole CTP during the development of this Plan and sought their acceptance of it. Copies of the approved Plan will be provided to Tall Pine Timber and Dale Hansen Ltd.

6.5.1 Deciduous Integration with Conifer Operations

Two categories of deciduous timber are integrated within the overlapping Quotas and Lodgepole CTP Area:

- ♦ Coniferous predominant stands - the deciduous component of pure coniferous (C) and conifer predominant mixedwood (CD) areas sequenced to and harvested by Coniferous Quota or CTP operations;
- ♦ Deciduous predominant stands - the pure deciduous (D) and deciduous predominant mixedwood (DC) component contained within the Lodgepole CTP, a Quota Cut Plan Area, or Coniferous Timber License.

Coniferous Predominant Stands

Weyerhaeuser recognizes that the pure coniferous (C) and coniferous predominant mixedwood (CD) stands from within the defined Lodgepole CTP and Quota holders Coniferous Timber Licences are available for harvesting by these users respectively.

Utilizing the deciduous timber that occurs incidentally (i.e., within the same harvest area) from Quota or CTP operations in C and CD stands is sound forest management and essential to securing our wood supply. In order to integrate operations for this timber source, the following procedures will be implemented:

- a) Weyerhaeuser's General Development Plan will include an estimate of the five-year integrated deciduous scheduling by Landscape Management Unit. This will be accomplished by using sequencing and forest inventory information to determine the deciduous and coniferous volumes and applying it to the Quota holder or the CTP's conifer volume scheduling, provided that scheduling information (at the block level) is made available to Weyerhaeuser by Quota holders or Public Lands and Forests Division.
- b) Where the incidental deciduous timber (within the conifer harvest area) is harvested by a Quota holder or the CTP Permit holder, it shall be done with Weyerhaeuser's consent prior to Annual Operating Plan approval and charged against the SYU deciduous production. The Licensee or Permittee shall be responsible for all operational clearances of Sustainable Resource Development. Weyerhaeuser will be responsible for scaling reports and submission of Crown dues on deciduous timber.
- c) Where Weyerhaeuser harvests the incidental deciduous timber, it shall be done under authority of the SYU and as soon as practical following the coniferous harvest so as not to impede reforestation and reclamation efforts. Both parties shall be responsible for their respective operational clearances from Sustainable Resource Development.



-
- d) Where Weyerhaeuser harvests and utilizes both the deciduous and coniferous components of a harvest area approved under the Annual Operating Plan for a given Coniferous Timber License of another Quota holder, it shall be done with prior approval of the Licensee. The conifer production will then be charged to the appropriate Coniferous Timber Quota.

Commitment and flexibility by Weyerhaeuser, Tall Pine, Lodgepole CTP Permit holders, and Public Lands and Forests Division are essential to successful integration. It must be recognized that the amount of integrated deciduous timber made available in any given year will ultimately depend on the level of harvest by Tall Pine and the Lodgepole CTP. If requested, Weyerhaeuser will provide covertime volume tables to other timber operators on the SYU Area so they may better estimate the integrated deciduous component from their coniferous harvest areas.

To assist in managing the integrated deciduous component on the SYU Area, a copy of the harvest designs and Annual Operating Plans prepared by / for Tall Pine and a summary of the Annual Operating Plans for the Lodgepole CTP will be submitted to Weyerhaeuser jointly with Public Lands and Forests Division.

Deciduous Predominant Stands

The second category of integrated deciduous wood supply is the pure deciduous (D) and deciduous predominant mixedwood (DC) stands contained within the Tall Pine Landscape Management Unit or the Lodgepole CTP. In principle, it is more logical for the D and DC covertime types to be operated by Weyerhaeuser because there is more deciduous volume than coniferous volume and the Plan calls for a deciduous management regime.

6.5.1.1 Tall Pine Timber Co. Ltd.

The Plan provides for conifer sequencing for Tall Pine Timber Co. Ltd. from within the Tall Pine LMU for the first 15 years (three five-year periods). This Plan led to a decision on the sequencing of coniferous predominant stands and integrated deciduous stands.

Operationally, the deciduous stands may be more suitable for sequencing simultaneously with Tall Pine's harvesting and, if so, should be harvested by them. Conversely, these stands may be of sufficient size or in such a location to be considered as a separate harvesting opportunity for Weyerhaeuser. In either case, this assessment will also consider long-term timber development and integrated resource management objectives. Coniferous timber harvest plans and operational factors may ultimately influence the Company's decision to harvest integrated deciduous stands in the same operating period as Tall Pine's operations. Therefore, an assessment will be made upon completion of a coniferous harvest design as to the feasibility of the Company's harvesting opportunity from within the Tall Pine LMU. Where appropriate, Weyerhaeuser will cooperate in developing a deciduous harvest design to integrate with the coniferous harvest design.

Figure 6-1 shows the timber harvesting landbase breakdown for the Tall Pine LMU into the broad covertime of pure coniferous (C), coniferous predominant mixedwood (CD), deciduous predominant mixedwood (DC), and pure deciduous (D).

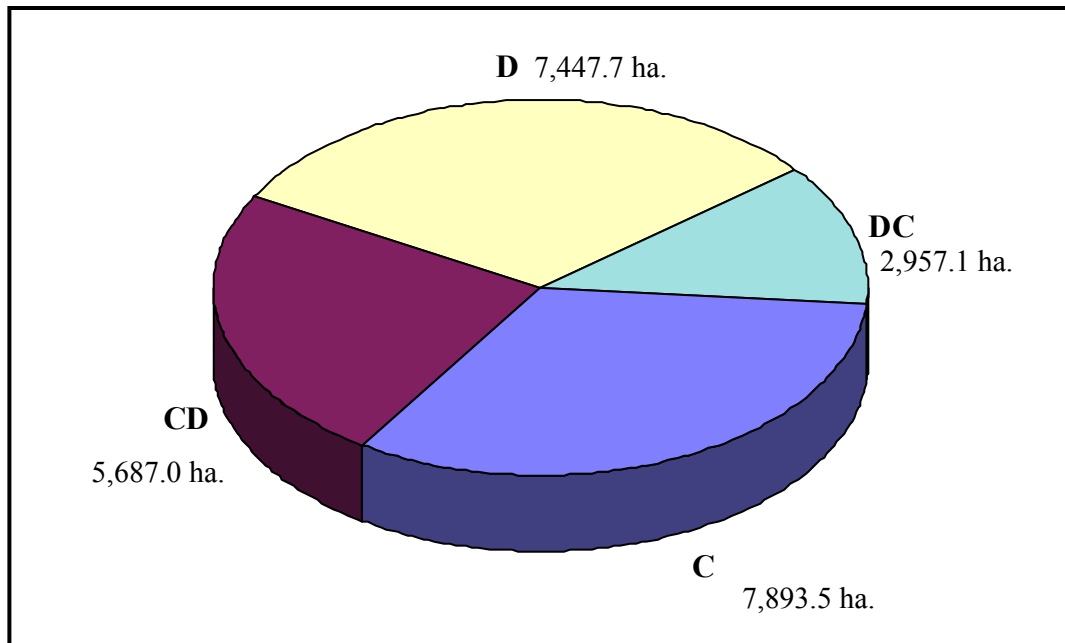


Figure 6-1 Tall Pine LMU Timber Harvesting Landbase by Covertypes

6.5.1.2 Dale Hansen Ltd.

The plan does not provide sequencing for Dale Hansen Ltd. Dale Hansen Ltd. has negotiated with Weyerhaeuser for the harvest and sale all of the company’s production for the life of this plan. All conifer volumes are derived from stands sequenced and harvested by Weyerhaeuser, and charged against Hansen’s Quota R120001.

6.5.1.3 Non-Quota Timber Operations (CTP)

Lodgepole Community Timber Program (CTP)

The DFMP has scheduled primarily coniferous stands within the Jack Knife H.D.A. for the Lodgepole (formerly Rose Cree West) CTP for the next 25 years (2000-2024) to meet the intent of the FMA agreement (see Figure 6-2). The CTP will manage this group of blocks under the direction of SRD.

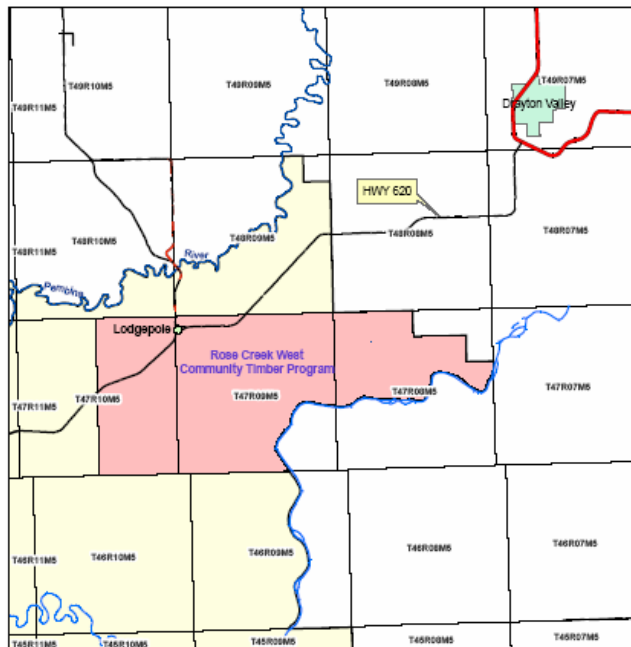


Figure 6-2 Map of the Lodgepole Community Timber Program on FMA 8500023 Jack Knife Harvest Design Area (H.D.A)

The Lodgepole Community Timber Program has an approved annual allowable cut of 4000 metres of conifer.

Weyerhaeuser has been scheduled in the remaining sequenced blocks within the Jack Knife H.D.A. The strategies for integrated deciduous volumes generated from the Lodgepole CTP are noted in Section 6.5.1. On an annual basis, Public Lands and Forests Division will provide the Company with the conifer volume and the stands scheduled for harvesting by the permittees for the upcoming five-year period to ensure that Weyerhaeuser can identify integrated deciduous volumes in the General Development Plan.

Public Lands and Forests Division will annually provide Weyerhaeuser volumes, by species group, generated from each block. Maps showing the areas harvested, and reforestation activities conducted during the previous year should also be provided.

Figure 6-3 shows the timber harvesting landbase (including grazing dispositions) for the Jack Knife H.D.A. area by the broad covertype of pure coniferous (C), coniferous predominant mixedwood (CD), deciduous predominant mixedwood (DC), and pure deciduous (D).

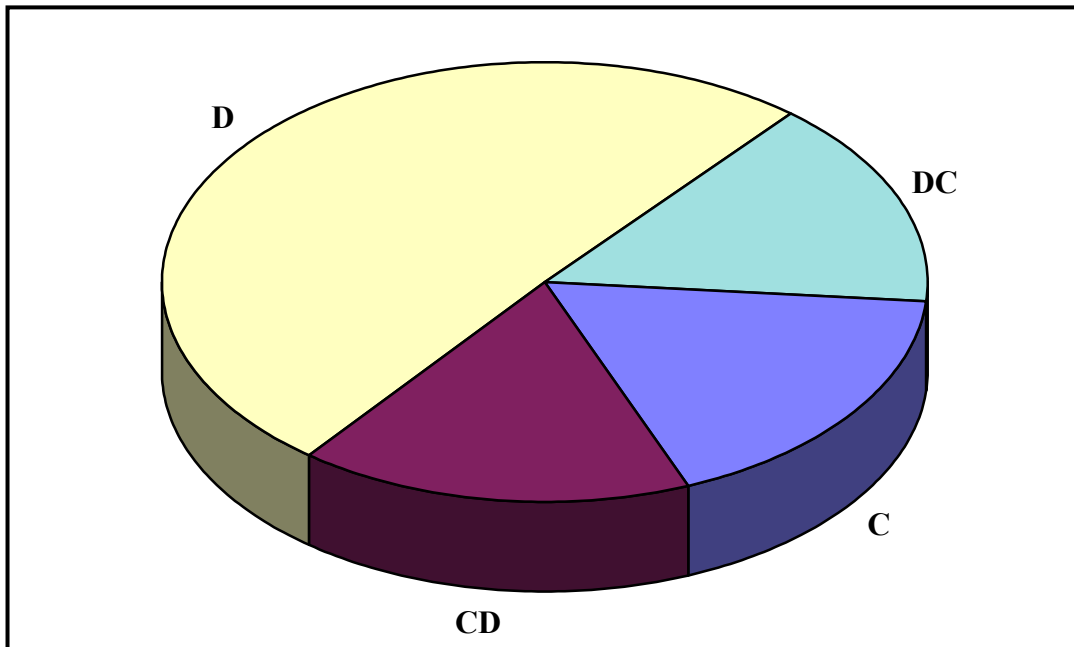


Figure 6-3 Jack Knife H.D.A Landbase by Coverture

Miscellaneous Timber Permits

Public Lands and Forests Division administer the Miscellaneous Timber Unit (CTP, DTP and LTP) program from the Clearwater Forest Area office. Permits are given to local users seeking wood for personal use such as firewood, posts, poles, building logs, and lumber.

The DFMP has scheduled areas for permit issuance. Sequenced stands represent the range of the log size profile for the SYU Area. Volume harvested under the permit program is chargeable to the MTU Annual Allowable Cut (AAC), and the volumes are not to exceed 1% of the FMA AAC on a five-year quadrant basis.

Areas where harvesting is completed will be given a harvest area designation and will have the appropriate reforestation work carried out by Sustainable Resource Development. Sustainable Resource Development will report to Weyerhaeuser annually the volume harvested, and will identify the areas harvested and reforestation work completed under the permit program.

Integrated Birch Harvesting

It is considered good forest management to maximize utilization for a given harvest area in order to reduce the area required for harvesting by all timber users. Birch volumes will be produced primarily as incidental volume from timber harvesting operations that focus mainly on aspen, balsam poplar, and conifer. As noted in **Table 1.5 in Chapter 1, (1.2.3)**, the forest inventory contains less than one-percent birch. Available birch volumes will fluctuate from year to year and will be distributed annually in consultation with Public Lands and Forests Division in the following order of priority for utilization:



1. Local sawmills and small, individual firewood permits
2. Commercial firewood producers
3. Use in Weyerhaeuser's manufacturing facilities.

All timber harvest planning will determine birch volumes for a given harvest area so as to identify potential sources in advance and ensure there is no conflict with other resource objectives (e.g., tree retention for ecological values). Actual harvesting will occur under the following guidelines:

- ◆ Birch logging will be conducted at the same time as, or immediately following the primary operations (i.e., not before).
- ◆ The birch component may be harvested by Weyerhaeuser's logging contractors under authority of the Annual Operating Plan for use by Weyerhaeuser or for sale to a birch user and all scaling and reporting will be the responsibility of Weyerhaeuser.
- ◆ The birch component may be harvested by a birch permittee immediately following timber operations under authority of an overlapping Timber Permit to be coordinated with SRD, and all scaling and reporting will be the responsibility of SRD.
- ◆ Minimum utilization shall be according to Ground Rules standards.
- ◆ Birch harvesting operations shall not unduly hinder the harvesting or reforestation activities of the primary timber operators (i.e. Weyerhaeuser, Tall Pine Timber, Dale Hansen, etc.).

The Company will work with Public Lands and Forests Division to find and develop a stand-alone birch harvesting area within the Clearwater Area to accommodate birch permittee requirements when no birch is available from SYU Area's harvesting activities as described above.

6.6 Integrated Resource Planning

Weyerhaeuser is committed to applying the multiple use concept to ensure that the timber harvesting landbase in the SYU Area is sustainable over the long term. The DFMP goal of integrating with the management activities of other resource users will be achieved by the continued commitment to the Province's policy of integrated resource planning. In essence, this policy recognizes that managing one resource affects the management of other resources.

The SYU Area lies within portions of the Rocky-North Saskatchewan, Brazeau-Pembina, Coal Branch and Nordegg-Red Deer River Integrated Resource Planning Areas. The Integrated Resource Plans (IRPs) reflect Alberta resource management "intents" as described in "A Policy for Resource Management of the Eastern Slopes Revised 1984". The three broad "areas of intent" from the Eastern Slopes Policy are protection, management and development. These "intents" will be implemented by establishing resource objectives that can be achieved within the planning areas under a multiple-use policy. These are defined geographically on the SYU Area by the IRP land use zones (see *Eastern Slopes Integrated Plan (ESIP)* (Map 6-1)).



The Integrated Resource Planning process determines how the resource management objectives are to be achieved by establishing resource management guidelines. The Company's land use strategy for the SYU Area is to incorporate the IRP resource management guidelines at all levels of planning.

6.6.1 Grazing

In 2002, Alberta Sustainable Resource Development produced a draft document entitled "*Guidelines for Integrating Timber Harvesting and Domestic Grazing in the Green Area*" (Appendix 6-6). Weyerhaeuser is currently following these guidelines on all planning and harvesting areas overlapped by grazing dispositions (permits, licenses and leases and allotments) being managed by Weyerhaeuser, Pembina Forestlands.



Weyerhaeuser and the grazing disposition holder(s) will develop joint Silviculture-Range Working Plans (SRWP). These plans set periods of harvesting and grazing, provide for cost sharing of cross fencing projects, and schedule joint inspections (before, during, and after operations). These joint plans are signed off and approved by both parties prior to commencing operations.

A new set of Timber and Grazing Integration Guidelines is currently under review, with expected completion in the very near future. When approved, these Guidelines will replace the 2002 Guidelines currently in use.

6.6.2 Trapping

Weyerhaeuser is committed to involving the trapping community in harvest design development and implementation. It is understood that timber harvesting can directly and immediately affect the habitat of furbearers harvested by trapping.²⁰ Weyerhaeuser will work with the trappers to minimize the impact of timber harvesting on the trapping sector.

Weyerhaeuser will consult individual registered trappers during the harvest plan development to discuss:

- ◆ location of proposed harvesting areas (harvest area and landscape levels) as part of the sequencing output from this Plan, the General Development Plan, and Annual Operating Plan (AOP) submissions;
- ◆ harvesting methods including stand retention levels, harvest patterns, recognition of unique areas, and timing;
- ◆ access (location, reclamation, and control methods);
- ◆ clean-up requirement such as brush pile retention; and
- ◆ reforestation activities and timing.

²⁰ A Review of the Effects of Logging on Furbearers Inhabiting the Alberta Forest Regions Managed by Weyerhaeuser Canada Ltd., Gilbert Proulx, 1998



Map 6-1 Eastern Slopes Integrated Plan





Reasonable effort will be made to contact the trapper in person to discuss the development of the harvest design and to obtain pertinent information from the trapper such as cabin locations, unique areas, location of lines and traps, etc. Follow-up contact with the trapper will be made prior to submission of the AOP to review the final harvest design. Any unresolved issues between Weyerhaeuser and the trapper will be communicated in the AOP to Sustainable Resource Development. The company will also arrange follow-up consultation with the registered trapper after harvesting to review plan implementation and interpretations.

As a member of the Alberta Forest Products Association, Weyerhaeuser will support the intent and guidelines of the Alberta Trappers Compensation Program Policy and Procedures. The Alberta Trappers Compensation Program provides a framework for compensating trapline operators of Registered Fur Management Areas for trapping business losses related to industrial activity. The Company will try to resolve any short-term disruption issues with the trapper prior to the issue being referred to the Compensation Board.

To ensure that the Company can meet the obligations noted above, Weyerhaeuser, from time to time, will request Sustainable Resource Development provide a list and map of the trappers and traplines that operate within Weyerhaeuser's allocated Crown sources.

6.6.3 Petroleum

Integration, Salvage and Afforestation Opportunities with the Petroleum Sector:

There are 3 components of Weyerhaeuser's approach to recognizing the impact of the petroleum sector upon the FMA. They include:

1. Minimizing the impact through coordinated land use planning.
2. Accounting for timber losses resulting from industrial activity.
3. Wellsite and road reclamation program.

1. Minimizing Losses Through Coordinated Land Use Planning

Weyerhaeuser is committed to applying the multiple-use concept to ensure that the timber harvesting landbase in the Unit is sustainable over the long term. The goal of integrating with the management activities of other resource users will be achieved by the continued commitment to the Provinces policy of Integrated Resource Planning (IRP). The policy recognizes that managing one resource affects the management of other resources. The IRP process determines how the resource management objectives are to be achieved by establishing resource management guidelines.

The company's intent is to establish and maintain clear lines of communication with all major industrial players across the FMA's. Major developments (main all-weather permanent roads) by both industries tend to bring them together to insure that impacts across the landscape are minimized where possible. SRD plays a major function in insuring that this co-ordination and planning occurs. The development of common corridors are an example of an end product resulting from this communication and coordination.



All industrial dispositions, when they occur on the FMA, are referred to the company for consent. Each disposition is reviewed for potential impacts on Company operations (i.e. research plots, permanent sample plots, road systems, etc.) and approved, amended or rejected accordingly. Company concerns are usually directed to the disposition holder and/or to SRD when appropriate.

2. Accounting for Losses Due to Industrial Activity

Existing seismic lines and other lands cleared for industrial use (i.e. well sites, LOC's, pipelines) are removed during the land base net down stage of all Timber Supply Analyses.

For dispositions occurring after the net timber supply analysis, an estimate of timber volume to be removed due to the activity is based on the amount of area removed from the FMA. The estimated volume is then charged against FMA production for that year. In other words, the amount of annual allowable cut available for Weyerhaeuser on an annual basis is reduced by the amount of volume estimated to have been removed from the FMA through this process.

3. Well Site and Road Reclamation

Well sites and roads to well sites that are no longer required by the energy sector do not need tree cover established on them prior to the dispositions being cancelled and returned to the FMA. In 2005, Weyerhaeuser began working cooperatively with the energy sector to vegetate these areas to tree cover, using a portion of the money the company has collected through the timber damage assessment process to fund this work.

In the long term, the goal is to have all abandoned well sites without a reclamation certificate, along with their associated road, pipeline and electrical rights of ways, reforested to trees. The intent is to work cooperatively with the energy sector during the reclamation process; the energy company will do the site preparation work, Weyerhaeuser will do the tree planting.

Starting in 2005, a program of reforesting abandoned industrial sites that have already received reclamation certificates has been implemented. In these instances, Weyerhaeuser will be responsible for both site preparation and tree planting. A specific schedule for reforesting these sites has not been established yet.

As well, Weyerhaeuser will be involved in two different strategies looking at wellsite reclamation:

1. Participation in the SRD Site Recovery Project.
2. Sponsoring research by Dr. D McNabb to better understand soil properties associated with these sites.

Additionally, Weyerhaeuser is considering joining an existing study group involving Alberta-Pacific Forest Industries (Al-Pac) and various oil & gas companies in North-east Alberta if deemed useful to our program.



It needs to be emphasized that at this time that the initial goal of this program is to re-establish forest cover, not timber production. The long-term performance of trees on reclaimed well sites is not well understood. We need to develop an understanding as to whether the sites can be brought to or near to the stated goal of equivalent capability for survival and growth. Weyerhaeuser is currently working with SRD to establish treatment, and perhaps monitoring, protocols that would likely result in acceptable regeneration survival and growth on these particular sites.

6.7 Public Involvement in Planning Process

As noted in the Public Involvement Plan, Weyerhaeuser will maintain ongoing consultation activities with affected and interested members of the public after the DFMP has been approved and implementation of the Plan has begun. This will involve identifying local and site-specific concerns and incorporating these concerns into the operational planning process. As well, Weyerhaeuser will take advantage of opportunities to identify and respond to broader strategic concerns raised by the public and incorporate these concerns into future DFMPs.

6.7.1 General Public

As part of Weyerhaeuser's public involvement program, Weyerhaeuser will be seeking input from the general public during the development of harvest designs. All harvest designs and approved AOPs will be available for public review at the offices of the Public Lands and Forests Division and at Weyerhaeuser's office. Such notice will be given to the public annually through local media. In addition, contact lists will be maintained for information dissemination. Subsequent input will be documented and directed to the appropriate planning process. The Company's stewardship and monitoring reports will also be made available to the general public upon request.

6.7.2 SYU Area Stakeholders

The Company will obtain input from local stakeholders for its operational planning process by:

- ◆ maintaining a list of stakeholders for the harvest design area with cooperation of Sustainable Resource Development staff
- ◆ seeking stakeholder input into the harvest design during development
- ◆ providing the completed harvest design to the stakeholders, outlining the stakeholders' input and how it was incorporated into the harvest design.





6.7.3 Forest Advisory Committee

Weyerhaeuser will continue to utilize the Forest Advisory Committee (FAC), at their discretion, to review and participate in the development of timber harvest designs and operational planning.

Groups currently represented on the Forest Advisory Committee

- ❖ Clearwater County
- ❖ Brazeau County
- ❖ Rocky Mountain Elk Foundation
- ❖ Pembina Institute
- ❖ Grazing
- ❖ Energy
- ❖ Trappers
- ❖ Métis
- ❖ First Nations (Alexis Nation and Sunchild)
- ❖ ATV users

6.7.4 Aboriginal Consultation

Weyerhaeuser is currently developing an Aboriginal Consultation Process internally, with implementation scheduled for late 2005. Alberta is also developing an Aboriginal consultation Directive for the entire Province, also expected to be available in 2005.

6.8 Ecological and Archeological Resources

The development and implementation of procedures for ecological and archeological resources reinforces Weyerhaeuser's goal to protect unique archeological and ecological sites. It is the Company's intention to recognize and report to Alberta all unique finds encountered during its forest management activities on the SYU Area.

6.8.1 Unique Ecological Resources

Weyerhaeuser has developed the following policy regarding unique ecological resources.

Policy for the Protection of Rare Physical Environments:

Purpose

To provide recognition of and management guidelines for the protection of rare physical environments.

Rare Physical Environments

Within the DFA are rare physical environments that host rare plant communities and/or species, and also provide habitat opportunities for small mammals, amphibians, reptiles and invertebrate species. Rare physical environments may also refer to unique geological formations or land forms markedly different from the surrounding area.

Examples of these sites include rock outcrops, small patches of forest remnants from previous fires, large diameter down logs and hibernacula.



Policy Statements

1. Weyerhaeuser will protect rare physical environments at the stand level, as outlined in the stand level ecological guidelines.
2. Rare physical environments of regional significance will be identified during the development of Detailed Forest Management Plans and / or at the harvest design phase of operations. Plans to protect the unique features of these areas will be developed. These plans may include:
 - ◆ Excluding operations from the area
 - ◆ Placing special notation on the area (e.g. PNT)
 - ◆ Modifying operations in terms of harvest pattern, method and /or timing

Annually, Weyerhaeuser will review its plans to protect rare physical environments and solicit public input through the FAC. Locations will be tracked using the Geographic Information System (GIS).

6.8.2 Historical Resources

The Company has implemented a historical resource procedure using the following strategies by:

1. Incorporating the predictive model to identify areas of potentially significant archeological resources, and
2. Reviewing the AOP by trained archeologists to field verify assumptions made by the model.

The Company's harvesting plans are available for public review. This allows the public to identify archeological and ecological resources and concerns specific to an area of harvesting and to the SYU in general.

6.9 Forest Protection and Health

6.9.1 Noxious Weeds

The invasion of noxious weeds in the forested areas of the Municipal Districts and Counties continues to be a concern. Weyerhaeuser recognizes that its timber harvesting operations are a potential mechanism for spreading such weeds and will cooperate with the Municipal Districts, Counties, Alberta government and other stakeholders in the control of noxious weeds in its operating areas.

Hand picking and disposal will be promoted for spot encounters; however Weyerhaeuser will use chemical control methods under permit as deemed necessary.



6.9.2 Fire Protection

Weyerhaeuser will continue to work cooperatively with government agencies at the provincial and municipal levels to protect the forest values entrusted to the Company. Weyerhaeuser's objectives in fire management are to protect:

1. human life
2. communities
3. sensitive watersheds and soils
4. natural resources, and
5. infrastructure.



Operationally, Weyerhaeuser will inform or solicit advice from Public Lands and Forests Division about:

- ◆ Opportunities for harvest designs to minimize the potential spread of fire. The Forest Fire Behavior Prediction System will be the basis for the decision model. Fire protection objectives will still be considered, although they conflict with our harvest design objectives, such as aesthetics or wildlife considerations;
- ◆ salvage of merchantable timber that has been damaged or killed by fire, as this will be a priority of utilization;
- ◆ The use of prescribed fire as a silviculture tool. Weyerhaeuser does not currently use this silviculture tool, however, it may be considered in the future. Weyerhaeuser will cooperate with other agencies in their use of prescribed fire for the purposes of research or vegetation management, provided that precautions are taken to ensure that no timber is at significant risk;
- ◆ Annual or short-term operational strategies for fire management that will be included in the Annual Fire Plan, the AOP plans, and/or at the harvest design stage.

Weyerhaeuser will also participate in the Foothills Firesmart Committee. The Committee brings together individuals from different industrial partners and SRD to actively pursue the opportunity to reduce fire spread potential in selected locations.

Weyerhaeuser has participated actively in some of the following activities:

- strategically placed harvest areas near Lodgepole
- thinning of mature trees to reduce dense canopy cover
- brushing of pipelines to provide better fire guard potential
- mowing of pipeline/powerline ROW adjacent to roadways and facilities.



6.9.3 Forest Health

Forest health is maintained through detection, surveying and monitoring, risk assessment, and the implementation of various management programs in forest stands.²¹ As a member of the Sustainable Resource Development's Regional Integrated Pest Management Working Group, the Company will cooperate with and assist Sustainable Resource Development in detecting and monitoring important forest insects, diseases and other natural damaging agents.

The detection and monitoring program will consist of the following practices:

- ◆ Annual monitoring of blowdown location and severity, as follows:
 - Utilizing the harvest area update process.
 - Undertaking aerial surveys focusing on areas known to be at risk.
- ◆ Providing training to planning and operations personnel on the identification of forest health agents.
- ◆ Collecting insect and disease (I/D) information (type and severity) when regenerating stands are surveyed.
- ◆ Procuring insect and disease information during the pre-harvest assessment surveys, in order to identify potential issues related to regeneration efforts.
- ◆ Using a reporting process when employees or contractors encounter an insect or disease problem.
- ◆ Developing in consultation with Sustainable Resource Development a record keeping and tracking system for forest health agents.

Weyerhaeuser will also work cooperatively with Sustainable Resource Development staff as they implement their forest pest monitoring program. This program has been strengthened since the Forest Insect and Disease Survey (FIDS) of Northern Forestry Centre, Canadian Forest Service, Natural Resources Canada has been disbanded. Aerial surveys for defoliation and surveys with pheromones have been the main monitoring tools used by Sustainable Resource Development.

In addition, any significant signs will be recorded as part of all forest inventories and operational stand assessments done by the Company. Any information that would indicate a potential problem will be reported to ASRD for consultation on what actions should be taken collectively to prevent damaging outbreaks.

In the event of significant outbreaks of insect or disease, DFMP spatial harvest sequences (SHS) may be adjusted.

6.10 Planning and Operating Ground Rules

The 1994 Provincial Ground Rules will be applied until a new set of rules has been approved for use.

²¹ Sustainable Resource Development web site



Weyerhaeuser was involved in the development of the July 2005 Blue Ridge Lumber Ground Rules using the current Ground Rules Development Template. The ground rules were negotiated in a zonal fashion, with involvement from Alberta Newsprint Company, Blue Ridge Lumber, Millar Western Industries, Mostowich Lumber Ltd., and SRD (forest Service and Fish and Wildlife Division).

Weyerhaeuser's intent is to utilize the July 2005 Blue Ridge Lumber Ground Rules as a starting point in negotiations with Alberta and the imbedded Quota Holders when developing a new set of Ground Rules. The Ground Rules will be developed for Weyerhaeuser's Pembina Forestlands operations, which covers both the Drayton Valley and Edson FMA's. Weyerhaeuser intends on updating the portions of these ground rules that are affected by the objectives and strategies identified and approved in the DFMP.

The Company, SRD and interested imbedded quota holders will develop a Terms of Reference for development of the ground rules. It is expected that the new ground rules will be in place within 6 months of DFMP approval. SRD represents the CTPP interests during ground rule development.

6.11 Education & Training

Weyerhaeuser Forestlands staff and contractors will be involved in education and training exercises for the purpose of providing adequate skills and knowledge to implement the Forest Management activities described in this plan.

Forestlands contractors include those undertaking the following activities within the SYU:

- harvesting
- reclamation
- road building
- site preparation
- block and road layout
- post-treatment assessments
- regeneration establishment and performance surveys, and
- growth and yield program.

6.12 Landuse Update Process

The following describes the series of events that occur to update disturbances on the SYU:

Industrial Landuse Activities:

The updates to the landuse layer occurs for those lands within the FMA. Non-FMA landuse activities are the responsibility of SRD.

- ◆ Landuse application request is consented to by Weyerhaeuser.
- ◆ Survey disposition (paper copy) is sent to contractor who digitizes the disposition and also calculates the Timber Damages (TDA).
- ◆ The digital version of the disposition is then loaded in the "TDA polygon" layer in our GIS.



- ◆ Every three months (1/4 year) all of the landuse dispositions in the TDA polygon layer are cross-referenced against the LSAS data to update attribute info.

Harvesting Activities

- ◆ In June of each year areas harvested in the previous AOP year are flown at a 1:20,000 scale and photographed.
- ◆ Images are developed, printed and scanned to provide ortho-rectified imagery as well as hard copy prints.
- ◆ Harvest area boundaries are digitized on screen by contractor and shapefiles (with new calculated areas) sent to Weyerhaeuser for loading into GIS.

Fires and Other Natural Disturbances

- ◆ Large fires are flown by SRD during fire suppression activities.
- ◆ Company incorporates GIS shapes, provided by SRD, into database.
- ◆ Currently no other natural disturbances (wind events, insects infestations, disease outbreaks, etc. are captured for updating. The company will make use of digital layers provided by SRD.

6.13 Re-Inventory of AVI

The next DFMP is scheduled for 2015. The following schedule outlines the activities to occur to re-inventory the AVI:

- ◆ 2008: identify prime contractor to complete the re-inventory of AVI to current government standards,
- ◆ 2009: obtain appropriate aerial photography for SYU,
- ◆ 2010-2011: complete the re-inventory of AVI to approved standards and complete the government approval process,
- ◆ 2012: start using new AVI in the DFMP approved by SRD, and
- ◆ May 1, 2015: planned new DFMP approved by SRD.

Aspects of AVI re-inventory (done on a 10- to 20-year cycle) include the following:

- a) Changes in vegetation e.g. species, heights, densities,
- b) Base features changes e.g. hydrography, roads, etc., and
- c) Many features must be retained from the original inventory e.g. cutblock boundaries.

Resource Information and Management Branch (RIMB) is responsible for setting, publishing and periodically updating inventory standards e.g. AVI 2.1 Interpretation Standard. AVI/forest inventories, including updates, must meet or exceed these standards. RIMB staff also audit AVI data and information to assure that standards are met.

The SRD Planning Standard sets standards for inventory data used in support of DFMP preparation.





7 PERFORMANCE MONITORING

An essential component of adaptive forest management is an effective monitoring program. Each objective will be monitored to assess management success. By monitoring these objectives and comparing actual forest condition and development with planning forecasts, variances with the objectives can be identified.

Monitoring will be an ongoing process integrated with regular operations of the Company. It will address the basic aspects of:

- ◆ Tracking actual activities versus planned activities,
- ◆ Tracking actual responses to forest management activities compared to expected responses,
- ◆ Identifying impacts arising from changes in assumptions, terms of reference or unplanned events, and
- ◆ Correcting activities or practices when required.

A variety of data sources including temporary and permanent sample plots, post harvest surveys, and experimental research plots, will be used to monitor forest condition and development.

Adaptive management also implies adjusting the course of action relative to the variances identified in monitoring. There is an opportunity to make operational adjustments within the implementation of the management plan. These operational adjustments may take the form of corrective activities or compensating activities. The corrective actions directly address the identified shortcoming or variance identified. A prime example of this type of activity would be re-treatment of a regenerating harvest area to meet a particular reforestation standard. An additional operational adjustment tactic would be compensation. This activity would indirectly address the identified variance by way of modifying plans. An example of a compensating adjustment could be re-classification of harvest areas to meet reforestation standards.

Reports of monitoring results and variances will be included in annual reports, stewardship reports (every five years) and future DFMP submissions.

7.1 Timber Supply Sensitivity Analysis (validation of assumptions)

Harvest sequence: A comparison of the approved SHS to actual areas cut will occur during the development of the next DFMP. Yearly reviews will not give an accurate picture of what is occurring across the FMA due to the flexibility in allowing operators to move across the landscape in an efficient and timely manner.

Regeneration Lag: Will be recalculated each subsequent DFMP.

Cull percent: The percentage cull on both deciduous and coniferous timber is a rolling average based on a number of years worth of data collection. The cull percent as it will apply to the next DFMP will be a result of another 6 years worth of data, but is expected to remain the same for a substantial number of years. Due to the aging nature of the forest, it might be suspected that cull will increase slightly in the near term before starting to trend downwards as the forest approaches a more regulated appearance.



Impacts of Temporary roads: See “Protocols” in section 6.1.4

7.2 Regeneration Standards

Regenerating stand cover types will be assigned prior to harvest and harvest areas will be reforested to standards defined for each strata (C, CD, DC, and D). Harvest areas will have surveys completed no later than years five, eight or fourteen, depending upon the survey standard being applied.

7.3 Annual Performance Monitoring Report

Purpose:

- ◆ To report on the forest management activities undertaken in the previous year that pertain to implementation of the DFMP strategies to meet the plan objectives. The time frames for management activities are identified for each objective, and generally reflect the following dates:
 - May 1 to April 30 (AOP year)
 - November 18 to November 17 (or as adjusted) (FMA year)
 - January 1 to December 31 (calendar year)

Content:

The content of the Annual Performance Monitoring Report may be adjusted over time with mutual agreement between SRD and the Company, or as deemed appropriate for public involvement. The Sustainable Forest Management Plan Annual Report (SFMP-AR) will provide much of the information identified below.

The Report will include, but may not be limited to the following items:

- A. Timber harvesting
 - ◆ Area and volume harvested by species group (SFMP-AR)
- B. Reforestation and silviculture activities summarized by:
 - ◆ Number of seedlings planted (species)
 - ◆ Area of site preparation (type) Number of seedlings planted (species)
 - ◆ Area of stand tending by type
 - ◆ Area of chemical treatments (by application type)
- C. Area summary of land withdrawals and additions (SFMP-AR)
- D. Significant natural disturbances (e.g. fire, insect, disease, blowdown) (SFMP-AR)
- E. Activities on afforestation and enhanced forest management (hectares)
- F. Summary of incidental replacement strategy results on pure ‘C’ and ‘D’ blocks (establishment and performance survey results)
- G. Cumulative variance to the spatial harvest sequence by LMU (from GDP)
- H. Compliance infraction – warnings and penalties
- I. Inventory work (timber and non-timber)
- J. Research work (SFMP-AR)
- K. Summary of public involvement activities, concerns or input (SFMP-AR)
- L. Summary of involvement in Provincial ‘Species at Risk’ Recovery Plans
- M. DFMP objectives (as identified in Chapter 5) and indicators



7.4 Stewardship Report

Purpose:

- ◆ To summarize the previous five annual reports;
- ◆ To discuss opportunities for change or adjustments in forest management practices that have been identified;
- ◆ To provide the public with an overall assessment of the DFMP progress, i.e. “Are we doing what we said we would do?”
- ◆ To identify deviations to the approved plan;
- ◆ To undertake analysis of unacceptable deviations as identified by the Company and Alberta; and
- ◆ To provide corrective actions.

Content:

The content of the Stewardship Report may be adjusted over time with mutual agreement between SRD and the Company. Therefore, the Report will include, but may not be limited to the following items:

- ◆ Review DFMP objectives and the TSA assumptions to:
 - Identify emerging trends or issues,
 - Identify deviations from the Approved plan,
 - Track all variances to the SHS; where the 20% threshold (by LMU, by decade) is exceeded, an assessment will be made to identify the impacts to the affected objectives and resulting AAC implications,
 - Describe any analysis that has been undertaken of deviations, and
 - Describe the corrective actions to be taken.

7.5 DFMP Objectives and Associated Indicators

The following indicators as they relate to the DFMP objectives will be used. Most of the indicators are currently being reported in the Annual report to the 2005 CSA Weyerhaeuser Sustainable Forest Management Plan (numbers in brackets). The Annual report will be used to supplement the Annual Performance Monitoring Report and the Five-Year Stewardship Report to minimize duplication of effort.

Timber operators will be required to provide information in this chapter that can be used in both the DFMP annual report or the SFMP annual report. Each indicator below will be reported by all timber operators (ALL) or just by Weyerhaeuser (WY).



Goal#1: Fibre Supply

1.1(a) Maintain AAC (m3/periodic annual cut/year): (ALL) Report annually on the volume harvested by SYU and allocation (SYU/DTA/CTQ/CTPP) (by FMU) (CSA 39).

1.1(b) Utilization standards (# warnings or penalties/year): (ALL) Report annually the number of warnings or penalties related to utilizations standards issued by SRD during the year. (CSA 42).

1.2 Industrial Salvage Volume (m3/year): (WY) Report annually on purchased salvage volumes by species group (conifer, deciduous) for the SYU.

1.3(a) Reforestation Success (% SR/Ha/year): (ALL) Report annually on percentage of area successfully passing either the establishment or the performance survey on the SYU (CSA 28).

1.3(b) Species used in reforestation (%/year): (ALL) Percent of reforestation using locally occurring species (CSA 11).

1.3(c) Regeneration Lag Time (% blocks/year): (ALL) Report annually on the number of blocks exceeding the two-year limit for reforestation activity (CSA 44).

1.4 Silviculture records (# blocks non-conformances/year); (#Ha of non-conformance/year): (ALL) Report annually on non-compliance issues as reported by SRD based on the annual May submissions to ARIS. Report should include #blocks showing non-conformance and the associated areas involved (CSA 44).

1.5 Salvage Timber at risk (dying) or dead (m3/year): (ALL) Report annually on volumes salvaged (for timber that is at risk or has been killed) on the SYU (CSA 45, 46 & 47).

1.6 Birch planning (m3 birch harvested/year): (ALL) Report annually on the volume of birch harvested by Weyerhaeuser and other operators (SRD to supply volume for “other” operators) (CSA 41).

1.7 Incidental Deciduous (# blocks not logged with incidental deciduous present/year): (WY) Report annually on incidences of incidental volumes (net of retention) remaining unharvested and deemed “lost” for harvesting purposes.

1.8 Sundance Volume Commitment (m3/year): (WY) Report annually on volumes delivered to Sundance from Weyerhaeuser (conifer) and to Weyerhaeuser from Sundance (deciduous) as per the SYU agreements (43,500 m3 respectively).

1.9 Expand season of logging (# days of logging/year); (# days of hauling/year): (WY) Report annually on the #days between the start of the active logging season and the end of the active logging season; (WY) report annually on the #days between the start of the active hauling season and the end of the active hauling season.

1.10 Steep Slopes Logging (# blocks>45%/year): (ALL) Report annually on the number of blocks harvested where slopes in all or part of the block exceeded 45%. These blocks should all have detail block plans present and approved in the AOP for that year.

Goal#2: Forest Diversity

2.1(a) Ecological Guidelines (% blocks with varying amounts of structure retention present/year); (%merchantable volume retained/ year): (ALL) Report annually on the retention of structure within harvest areas, including an estimate of the average amount of merchantable timber left within harvest areas (CSA 4).



2.1(b) Coarse woody debris (% harvest areas by amount/light/medium/heavy): (ALL) Report annually coarse woody debris in harvest areas that are sampled during stand retention surveys to estimate varying degrees of coarse woody debris (CWD) left in recently logged areas (CSA 3).

2.1(c) Areas of unsalvaged timber (ha/year): (WY) Report annually the amount of area left unsalvaged in fire-killed timber.

2.2(a) Old growth (% stands/seral stage): (WY) This indicator will be evaluated at the next DFMP. (CSA 1)

2.2(b) Vary block sizes (range of harvest area sizes (ha)/year): (ALL) Report annually the minimum and maximum as well as the average block size (CSA 2).

2.3(a) Stanley Output (% variance/ harvest design/ year): (ALL) Report annually the cumulative variance to the spatial harvest sequence by harvest design area (H.D.A.) for the decade, starting with period two of the plan (i.e. periods two and three will represent the first decade for variance purposes).

2.3(b) Indicator Species (surveys/year): (WY) Report annually on bird and furbearer surveys completed (CSA 10).

2.3(c) Habitat for threatened or endangered species (ha/year): (ALL) Report annually the areas protected during the planning and operating stages annually (CSA 16).

2.4 Critical Wildlife Area (incidence/ year): (ALL) Report annually on the number of incidents of harvesting outside of approved operating windows for blocks within critical wildlife areas (CSA 14).

Goal#3: Ecosystem Capacity

3.1 New road development (km. of new roads/year); (% block area>5% disturbance/year): (ALL) Report annually on the length of permanent roads (LOCs) constructed by all timber operators on the SYU. (ALL) The report should include the Road Name and LOC number. Report annually on the percent of blocks in the AOP that exceed the 5% disturbance threshold for inter-block roads (CSA 34 & 35).

3.2 Minimize disturbance (warnings or penalties / year): (ALL) Report annually incidents of excessive soil disturbance (CSA 18).

Goal#4: Watersheds

4.1 Provincial Water Act (#warnings or penalties/year): (ALL) Report annually the number of warnings and penalties regarding water quality (CSA 20).

4.2 Follow ground rules and guidelines (#warnings or penalties/year): (ALL) Report annually the number of warnings and penalties regarding water quality (CSA 20, 21 & 23).

4.3 Erosion (#corrective actions/year): (ALL) Report annually on the number of corrective actions taken on roads on the SYU regarding erosion control measures (CSA 20 & 23).

4.4 Watershed assessment (%watersheds assessments completed/year): (ALL) Report annually on the percentage of watershed assessments completed during the harvest design stage (CSA 24).



Goal#5: Public Accountability

5.1 Public Input (#open houses/year): (ALL) Report annually on the number and type of consultation events that occurred (CSA 31, 32 & 60).

5.2 Educate and communicate (# presentations/year): (WY) Report annually on the number and type of contacts that have occurred, including school presentations, presentations to interested groups, presentations to municipal governing bodies, etc (CSA 33 & 60).

5.3 Updates to FAC (#updates/year): (WY) Report annually on the number of updates to the Forest Advisory Committee regarding ongoing operational planning, identifying the planning areas discussed with the Committee (CSA 60).

5.4 Consultation with Aboriginal Groups (#consultations/year): (ALL) Report annually on the number of consultations occurring with First Nations and Métis groups (CSA 52, 53, 54 & 55).

5.5 Land neighbour contacts (# land neighbours contacted/year): (ALL) Report annually on the number of notifications to adjacent landowners or Communities (CSA 31).

5.6 Input from Tourism and Recreation Operators (# consultations/year): (ALL) Report annually on the number of contacts with affected tourism and recreation operators during planning, logging, hauling or silviculture operations (CSA 31).

5.7 Trapper Contacts (% of trappers contacted/ harvest design/ year): (ALL) Report annually on the number of Trappers mail outs during the harvest design stage (CSA 31).

Goal#6: Resource Integration

6.1 Viewsheds (#aesthetic issues/year): (ALL) Report annually the number of times an aesthetic issue arises, resulting in changes to harvest or block design, or through concerns raised by the public or by an affected stakeholder (CSA 31).

6.2 Grazing Plans (#blocks / year): (WY) Report annually the number of blocks logged upon grazing dispositions.

6.3 Grazing Neighbour (% contact/year): (WY) Report annually on the percent of grazing disposition holders contacted that are on or adjacent to Weyerhaeuser operations (CSA 31).

6.4 Common Corridors (# of common corridors/year): (WY) Report annually on the number of common corridors developed between Weyerhaeuser and the petroleum industry (CSA 27).

6.5 Landbase Deletions (# hectares/disposition type/year): (WY) Report annually the landbase withdrawals (CSA 26).

6.6 Trappers consultation process (# compensation issues/year): (WY) Report annually on the number of compensation issues that arise over the year. Weyerhaeuser will interact with the trapping community in an effort to avoid any compensation issues. Employees should be knowledgeable of the process, and be able to articulate the process with a trapper if required (CSA 31).

6.7 Shared road development (km. of roads/year): (ALL) Report annually on the number of shared road development agreements affecting permanent roads (LOCs) on the SYU. These agreements may be either formal or informal in nature (CSA 34).



6.8 Access Control (# current access points/year): *(ALL)* Report annually the number of access control points on the SYU. This would include the name of the road having the control feature in place, and the control feature utilized. This would only include gating or major ditch/berm construction. Rollback would be considered as normal practice for temporary road abandonment.

6.9 Sequencing of volume in Lodgepole CTP (m3 harvested/ year): *(WY)* Report annually on the volume of conifer cut by the Lodgepole CTP group (CSA 39 & 51).

6.10 Integrated Designs (% plans integrated/year): *(WY)* Report annually on the number of integrated plans developed with either the CTP group or the overlapping Quota Holders. SRD will manage the CTP planning review and approval process internally, with design help from Weyerhaeuser (CSA 31).

6.11 Weed Control (# control events/year): *(ALL)* Report annually the number of weed control activities undertaken during the previous growing season. This would include consultations with SRD or other stakeholders (CSA 8).

Goal#7: Unique Sites

7.1 Unique ecological sites (# sites identified/year); (#sites disturbed/year): *(ALL)* Report annually the number of new unique ecological sites identified throughout the year. *(ALL)* Report annually the number of unique sites disturbed as a result of operations (CSA 16).

7.2 Historical Resources (#sites identified/year); (# sites disturbed/year): *(ALL)* Report annually the number of new archeological and historical resources found on the SYU. This would include those sites identified by permitted archeologists during field visits. *(ALL)* Report annually the number of disturbed historical/ archeological sites as a result of operations (CSA 57 & 65).

7.3 Important Flora and Fauna Sites (# sites identified/year): *(ALL)* Report annually the number of new sites of local importance for either plant or animal species (CSA 13).

7.4 Maintain RET Habitat (#sites identified/ year): *(ALL)* Report annually the number of new rare, endangered or threatened floral and fauna species located on the SYU (CSA 13 & 14).

Goal#8: Increasing the Timber Supply

8.1(a) Afforestation (#ha./ year): *(WY)* Report annually the hectares reforested that are not currently a reforestation liability for Weyerhaeuser. This would include reclaimed well sites, abandoned pipelines, abandoned roads, etc (CSA 40).

8.1(b) Percent blocks reforested with improved stock (%/year): *(WY)* Report annually the hectares planted with improved stock.

8.2 Participation with SRD (# participation events/ year): *(WY)* Report annually the number of times Weyerhaeuser staff interacts with SRD or other stakeholders regarding insects and disease, either on the local (SYU) or Provincial level (CSA 46 & 47).





8 FUTURE CONSIDERATIONS

Future considerations should be viewed as opportunities outside of this DFMP. In themselves, they should not impede approval of the remaining components of the DFMP.

8.1 *Insects and Disease*

When warranted, Weyerhaeuser will participate with research involving the Forest Health Branch and other industry partners to develop strategies and techniques to mitigate damage to the forest resource from forest insects and diseases. Before control measures are implemented, it is imperative to truly understand and quantify the impact to the forest resource and evaluate the potential risks (e.g. ecological), when implementing a control program. The monitoring program, therefore, is critical in building a knowledge set over time that will allow Weyerhaeuser to rank the importance of various insects and diseases in terms of their potential impact on the forest resource.

The Forest Management Branch is developing a predictive modeling tool that will enable stands to be assessed for hazards related to the Mountain Pine Beetle. The entire FMA should be mapped to identify key areas on the FMA that could be threatened by this beetle. A model for *Armillaria* is also being developed.

8.2 *Long-term Harvesting and Grazing Implications*

Objectives for forage production must be balanced with objectives for fibre production. Further review is required to understand the impact of grazing operations on timber values, and vice versa. The impact of harvesting on AUM (overstocking of deciduous blocks) and grazing on AACs (under stocking of harvest areas) are assumed but not well documented. The realization is that there are impacts on both. Flexibility must be built into higher-level plans that deal with the impacts on both AUMs and AACs.

Weyerhaeuser is currently working on a Grazing Pilot Project that analyses the potential for grazing upon the FMA. The group is currently reviewing the options available on a temporal and spatial basis.

Weyerhaeuser is not opposed to grazing within the FMA. However, due to the potential impacts of grazing on long-term forest productivity, there are some conditions that should be applied on all new requests for grazing dispositions.



Individuals requesting a grazing disposition within the FMA must agree to and abide by a joint Silviculture-Range Working Plan (SRWP). The SRWP may include but not be limited to:

- ◆ Deferred grazing period (1 – 3 years)
- ◆ Rotational grazing period (1 – 3 years)
- ◆ Harvest sequence, number of harvest passes, and number of blocks
- ◆ Cost sharing of cross fencing
- ◆ Access retention after operations
- ◆ Site improvements that will benefit both parties
- ◆ Joint inspections at the request of either party, and
- ◆ Remedial silvicultural action on affected areas.

Fence line clearing on the perimeter fences should be limited to a maximum of 10 metres, and cross fencing should be limited to five (5) metres or less. This will allow adequate access for fencing as well as movement of cattle along the fence-line, while limiting the amount of productive land lost. The grazing disposition holder should also take advantage of existing openings for fence placement (i.e.: seismic lines, pipeline ROWs, roads, etc.) if appropriate.

Finally, grazing operators must realize that forest communities change over time. As vegetation types change, either through natural or manmade processes, carrying capacities, in regards to grazing, change. It is unrealistic to assume that the carrying capacity of grazing units is static over time, and is unaffected by changes in vegetation communities, either by disturbance, or through time. Plan updates should occur that recalculate grazing carrying capacity at the time of disposition renewal to reflect these changes.

8.3 Enhanced Forest Management

Development of an enhanced forest management program for future implementation on the SYU Area is continuing. As such this Plan does not incorporate the benefits of enhanced forest management activities. The intent of the enhanced forest management program for the period of this plan is to establish trials to:

- ◆ gain operational experience in implementing these activities;
- ◆ demonstrate the results of these activities; and
- ◆ provide a basis for evaluating the forest response to these activities

The enhanced forest management activities are focused in the following areas:

- ◆ coniferous understorey planting;
- ◆ density management through spacing and cleaning;
- ◆ incremental increased stocking of satisfactorily reforested sites; and
- ◆ rehabilitation of low density stands currently not included in the productive forest landbase
- ◆ tree improvement (white spruce program, hardwood program)



Knowledge gained from these trials will aid in determining an appropriate enhanced forest management strategy for submission in future detailed forest management planning.

Weyerhaeuser continues to provide both in-kind and financial support to a number of initiatives with the general objective of building capacity to support the rational implementation of enhanced forest management. Weyerhaeuser is a member of and participates in the following organizations:

- ◆ Western Boreal Growth and Yield Cooperative (WESBOGY)
- ◆ Foothills Growth and Yield Association (FGYA)
- ◆ Mixedwood Management Association (MWMA)
- ◆ Huallen Seed Orchard (HASOC)
- ◆ Western Boreal Aspen Coop (WBAC)

Weyerhaeuser also collaborates and is involved with the:

- ◆ Sustainable Forest Management – Centre of Excellence
- ◆ University of Alberta Institute for Enhanced Forest Management

8.4 Jasper Park Boundary

As a result of public and stakeholder consultation during the development of the DFMP, it was decided that a special process for managing forest operations adjacent to the Park boundary in the Marshybank LMU (specifically the Chungo Lookout HDA) was warranted. An understanding between Weyerhaeuser and Parks Canada has been established for further consultation, assessment and planning which will result in future recommendations to the Province for the area in question. A process for further study, planning and decision making for the area in question will be developed to determine future DFMP input or possibly revisions. The normal TSA assumptions will apply to this area; however there will be no sequenced area for the first 10 years of the DFMP.

8.5 Marshybank Ecological Reserve

As a result of establishing the Brazeau Canyon Wildland Provincial Park, Alberta has agreed to add back into the FMA the residual portion of the original Marshybank Ecological Reserve.

8.6 Forest Inventory and Timber Supply Analysis

This type of work may include, but is not limited to:

- ◆ enhancement of forest inventory information for certain areas of the SYU Area
- ◆ cooperation with other agencies on landscape management assessments (e.g. fire management, land use developments)
- ◆ improving timber supply modeling capacity



8.7 Ecological Sustainability

As described in the DFMP, future initiatives regarding ecological sustainability will focus on those activities designed to further knowledge of forest ecosystems and the impacts of forest management. This would encompass monitoring trends in biodiversity indicators, assessing the range of natural variation, and contributing to specific research / monitoring projects developed in conjunction with Fish and Wildlife Division and other research agencies.

8.8 Alternative Regeneration Standards

Weyerhaeuser has communicated a commitment to pursue alternative regeneration standards for FMA operations in Alberta. A 'first approximation' of the alternative regeneration standards will be developed in 2006. In accordance with communication with ASRD, once these alternative regeneration standards are approved, they will be used to evaluate regeneration performance until 2010. In 2010, a 'second approximation' of alternative regeneration standards will be submitted to ASRD. Also, any adjustment in harvest levels associated with regeneration performance will be deferred until 2010.

8.9 Historical Resources Predictive Model

Several areas within the SYU have not been analyzed with the Historical Resources Predictive Model. This includes the two small areas in old FMU R1 on the very east side of the SYU, and the Marshybank Ecological Reserve. Weyerhaeuser intends to work with its service provider to undertake this analysis in the near future.

8.10 LMU for Areas Outside of FMA

Several GIS layers used in the DFMP do not cover the entire SYU. Examples of this would include the LMU and the HDA layers. The original layers were constructed to cover the Gross FMA area only, not the SYU as defined and described in the DFMP.

8.11 Research and Long-term Monitoring

Research and long-term monitoring is an ongoing process for many companies that have a Forest Management Agreement. Research funded by Weyerhaeuser is either specific to the Drayton Valley FMA or is general in nature and can be applied across any of Weyerhaeuser's timber holdings in Alberta.



The following list identifies some of the research, monitoring or inventory programs either completed or ongoing at the submission of the DFMP.

- ◆ Forest structure and bats
- ◆ Sustainable Forest Management Research
- ◆ Effects of livestock, wildlife and harvesting on aspen regeneration and forage supply
- ◆ Stand condition and site factors affecting the regeneration of healthy and overmature aspen
- ◆ Furbearers surveys
- ◆ Owl surveys
- ◆ Fisheries surveys
- ◆ Song bird surveys
- ◆ Western Boreal Co-op
- ◆ Tree Improvement Program
- ◆ Research on Shepherd's Crook
- ◆ Monitoring Elk in the East Central Foothills
- ◆ Wolf and Elk Movements and Distribution in the Weyerhaeuser/Jasper National Park Trans Boundary Study Area.
- ◆ Centre for Enhanced Forest Management

8.12 Adjustment of Salvage Chargeability and Tracking

Current Situation:

Current practices that account for industrial losses will be followed until such time as there is an agreement in place between both parties.

Currently, existing seismic lines and other lands cleared for industrial use (i.e. well sites, LOC's, pipelines) are removed during the land base net down stage of all Timber Supply Analyses.

For dispositions occurring after the net timber supply analysis, an estimate of timber volume to be removed due to the activity is based on the amount of area removed from the FMA. The estimated volume is then charged against FMA production for that year. In other words, the amount of annual allowable cut available for Weyerhaeuser on an annual basis is reduced by the amount of volume estimated to have been removed from the FMA through this process. Issues with this approach include:

- Volume from the non-productive land base is charged against annual allowable cut.
- Volumes available to Weyerhaeuser and other forest operators are impacted on a short-term basis by the level of oil and gas activity on the FMA. The forest industry has little control over how much activity occurs or how much volume is required to be salvaged by the energy sector and made available for purchase.



Proposed:

There is a need to ensure that the combined impacts of the forest industry and energy sector does not result in over-harvesting of the timber resource as measured by the approved AAC.

Weyerhaeuser would like to change how future industrial losses are accounted for, starting in 2006, to be more consistent with how other losses (fire losses for example) are accounted for. Quota Holders should be given the opportunity to review the process prior to approval by SRD as this may impact the chargeability of salvaged purchased by them.

This process could be as follows:

- a) Industrial activities identified on the landbase (seismic lines, well sites and other industrial clearings) will be removed from the net land base during timber supply analysis at each dfmp.
- b) Timber salvaged from industrial clearing will be tracked as it crosses the scale and charged against FMA production accordingly.
- c) The amount of newly cleared area resulting from these industrial activities will be tracked on an annual basis. The area will be tracked by the Unit that contributed to the approved AAC calculation (As an example, by FMU in Edson and by FMA in Drayton Valley).

Should the cumulative amount of new area cleared since the last timber supply analysis (or other mutually agreed upon date) exceed 2.5% of the total productive forest landbase prior to the next DFMP submission, Weyerhaeuser will confer with Alberta on implications to the approved AAC. Weyerhaeuser is committed to a reduction of the approved AAC of an equivalent percent as determined above for the duration of the DFMP and/or until a new AAC has been calculated, or will undertake an analysis of the cumulative effects of land use activities since the establishment of the current AAC and the relative impacts of such activities.

Further discussion is required between the company and SRD to finalize a new method acceptable to all parties, and Weyerhaeuser recognizes that approval of the DFMP does not imply that the above proposal is also approved.



APPENDIX 6-1

**SILVICULTURE STRATEGIES FOR
THE DRAYTON VALLEY FMA**





Appendix 6-1: Silviculture Strategies for SYU R12

Regenerating Stand Objective					Regenerated Stand Treatments			
Yield Stratum	Species Group	Site Class	Crown Closure	Estimated 10 Year Area (Hectares)	Establishment		Maintenance	
					Stand Conditions	Tactics	Stand Conditions	Tactics
1,2,3,4	Conifer Dominated C and CD Lower Foothills	Good	A, B, C, D		<ul style="list-style-type: none"> ➤ Spruce and/or pine ➤ Moist sites ➤ Competitive vegetation 	Site prep and plant conifer Or Straight plant if site prep not possible C (1400-2000 SPH) CD (1000 SPH)	Where conifer crop trees exist and competition is great enough to cause concern that survival or performance may be jeopardized	Tend (herbicide and/or mechanical) stands to release conifer component. Retain some deciduous component to reflect CD standard and some component of incidental deciduous.
					<ul style="list-style-type: none"> ➤ Spruce and/or pine ➤ Well drained sites ➤ Low competition 	Plant conifer with no site preparation C (1400-2000 SPH) CD (1000 SPH)		
					<ul style="list-style-type: none"> ➤ Pine dominated ➤ Well drained sites ➤ Low competition 	Site preparation for natural seeding (drag)		
5, 6, 7, 8	Conifer Dominated C and CD Lower Foothill	Medium	A, B, C, D		<ul style="list-style-type: none"> ➤ Spruce and/or pine ➤ Moist sites ➤ Competitive vegetation 	Site prep and plant conifer Or Straight plant if site prep not possible C (1400-2000 SPH) CD (1000 SPH)	Where conifer crop trees exist and competition is great enough to cause concern that survival or performance may be jeopardized	Tend (herbicide and/or mechanical) stands to release conifer component. Retain some deciduous component to reflect CD standard and some component of incidental deciduous.
					<ul style="list-style-type: none"> ➤ Spruce and/or pine ➤ Well drained sites ➤ Low competition 	Plant conifer with no site preparation C (1400-2000 SPH) CD (1000 SPH)		
					<ul style="list-style-type: none"> ➤ Pined dominated ➤ Well drained sites ➤ Low competition 	Site preparation for natural seeding (drag)		



Regenerating Stand Objective					Regenerated Stand Treatments			
Yield Stratum	Species Group	Site Class	Crown Closure	Estimated 10 Year Area (Hectares)	Establishment		Maintenance	
					Stand Conditions	Tactics	Stand Conditions	Tactics
9	Conifer Dominated C and CD Lower Foothill	Poor	A, B, C, D		<ul style="list-style-type: none"> ➤ Spruce and/or pine ➤ Moist sites ➤ Competitive vegetation 	Site prep and plant conifer Or Straight plant if site prep not possible C (1400-2000 SPH) CD (1000 SPH)	Where conifer crop trees exist competition is great enough to cause concern that survival or performance may be jeopardized	Tend (herbicide and/or mechanical) stands to release conifer component. Retain some deciduous component to reflect CD standard and some component of incidental deciduous.
					<ul style="list-style-type: none"> ➤ Spruce and/or pine ➤ Well drained sites ➤ Low competition 	Plant conifer with no site preparation C (1400-2000 SPH) CD (1000 SPH)		
					<ul style="list-style-type: none"> ➤ Pine dominated ➤ Well drained sites ➤ Low competition 	Site preparation for natural seeding (drag)		
10, 11, 12, 13	Conifer Dominated C and CD Upper Foothill	Good	A, B, C, D		<ul style="list-style-type: none"> ➤ Spruce and/or pine ➤ Moist sites ➤ Competitive vegetation 	Site prep and plant conifer Or Straight plant if site prep not possible C (1400-2000 SPH) CD (1000 SPH)	Where conifer crop trees exist competition is great enough to cause concern that survival or performance may be jeopardized	Tend (herbicide and/or mechanical) stands to release conifer component. Retain some deciduous component to reflect CD standard and some component of incidental deciduous.
					<ul style="list-style-type: none"> ➤ Spruce and/or pine ➤ Well drained sites ➤ Low competition 	Plant conifer with no site preparation C (1400-2000 SPH) CD (1000 SPH)		
					<ul style="list-style-type: none"> ➤ Pine dominated ➤ Well drained sites ➤ Low competition 	Site preparation for natural seeding (drag)		



Regenerating Stand Objective					Regenerated Stand Treatments			
					Establishment		Maintenance	
Yield Stratum	Species Group	Site Class	Crown Closure	Estimated 10 year Area (Hectares)	Stand Conditions	Tactics	Stand Conditions	Tactics
14, 15, 16, 17	Conifer Dominated C and CD Upper Foothill	Medium	A, B, C, D		<ul style="list-style-type: none"> ➤ Spruce and/or pine ➤ Moist sites ➤ Competitive vegetation 	Site prep and plant conifer Or Straight plant if site prep not possible C (1400-2000 SPH) CD (1000 SPH)	Where conifer crop trees exist competition is great enough to cause concern that survival or performance may be jeopardized	Tend (herbicide and/or mechanical) stands to release conifer component. Retain some deciduous component to reflect CD standard and some component of incidental deciduous.
					<ul style="list-style-type: none"> ➤ Spruce and/or pine ➤ Well drained sites ➤ Low competition 	Plant conifer with no site preparation C (1400-2000 SPH) CD (1000 SPH)		
					<ul style="list-style-type: none"> ➤ Pine dominated ➤ Well drained sites ➤ Low competition 	Site preparation for natural seeding (drag)		
18	Conifer Dominated C and CD Upper Foothill	Poor	A, B, C, D		<ul style="list-style-type: none"> ➤ Spruce and/or pine ➤ Moist sites ➤ Competitive vegetation 	Site prep and plant conifer Or Straight plant if site prep not possible C (1400-2000 SPH) CD (1000 SPH)	Where conifer crop trees exist competition is great enough to cause concern that survival or performance may be jeopardized	Tend (herbicide and/or mechanical) stands to release conifer component. Retain some deciduous component to reflect CD standard and some component of incidental deciduous.
					<ul style="list-style-type: none"> ➤ Spruce and/or pine ➤ Well drained sites ➤ Low competition 	Plant conifer with no site preparation C (1400-2000 SPH) CD (1000 SPH)		
					<ul style="list-style-type: none"> ➤ Pine dominated ➤ Well drained sites ➤ Low competition 	Site preparation for natural seeding (drag)		



Regenerating Stand Objective					Regenerated Stand Treatments			
					Establishment		Maintenance	
Yield Stratum	Species Group	Site Class	Crown Closure	Estimated 10 year Area (Hectares)	Stand Conditions	Tactics	Stand Conditions	Tactics
19, 20, 21, 22	Conifer Dominated C and CD Sub Alpine	Good	A, B, C, D		<ul style="list-style-type: none"> ➤ Spruce and/or pine ➤ Moist Sites ➤ Competitive vegetation 	Site prep and plant conifer Or Straight plant if site prep not possible C (1400-2000 SPH) CD (1000 SPH)	Where conifer crop trees exist competition is great enough to cause concern that survival or performance may be jeopardized	Tend (Mechanical and/or herbicide) to reduce competition where necessary.
					<ul style="list-style-type: none"> ➤ Spruce and/or pine ➤ Well drained sites ➤ Low competition 	Plant conifer with no site preparation C (1400-2000 SPH) CD (1000 SPH)		
					<ul style="list-style-type: none"> ➤ Pine dominated ➤ Well drained sites ➤ Low competition 	Site preparation for natural seeding (drag)		
23	Conifer Dominated C and CD Sub Alpine	Poor	A, B, C, D		<ul style="list-style-type: none"> ➤ Spruce and/or pine ➤ Moist sites ➤ Competitive vegetation 	Site prep and plant conifer Or Straight plant if site prep not possible C (1400-2000 SPH) CD (1000 SPH)	Where conifer crop trees exist competition is great enough to cause concern that survival or performance may be jeopardized	Tend (mechanical and/or herbicide) to reduce competition where necessary
					<ul style="list-style-type: none"> ➤ Spruce and/or pine ➤ Well drained sites ➤ Low competition 	Plant conifer with no site preparation C (1400-2000 SPH) CD (1000 SPH)		
					<ul style="list-style-type: none"> ➤ Pine dominated ➤ Well drained sites ➤ Low competition 	Site preparation for natural seeding (drag)		



Preharvest Stand Objective					Regenerated Stand Treatments			
Yield Stratum	Inventory Species Group	Site Class	Crown Closure	Estimated 10 year Area (Hectares)	Establishment		Maintenance	
					Stand Conditions	Tactics	Stand Conditions	Tactics
24, 25, 26	Deciduous Understorey C, CD and DC Switch* Stands Lower Foothills Upper Foothills Sub Alpine	Good, Medium, Poor	B, C, D		<ul style="list-style-type: none"> ➤ Pure C ➤ Mixedwood CD and DC 	Planned Understorey protection and fill in plant where necessary	Where conifer crop trees exist competition is great enough to cause concern that survival or performance may be jeopardized	Tend (herbicide and/or mechanical) stands to release conifer component. Retain some deciduous component to reflect CD standard and some component of incidental deciduous.
					<ul style="list-style-type: none"> ➤ Mixedwood CD and DC 			
Regenerating Stand Objective					Regenerated Stand Treatments			
Yield Stratum	Species Group	Site Class	Crown Closure	Estimated 10 year Area (Hectares)	Establishment		Maintenance	
					Stand Conditions	Tactics	Stand Conditions	Tactics
27, 28, 29, 30	Deciduous Dominated D and DC Lower Foothills	Good	A, B, C, D		<ul style="list-style-type: none"> ➤ Mixedwood DC 	Site prep and plant conifer in selected areas	Where conifer crop trees exist competition is great enough to cause concern that survival or performance may be jeopardized	.Tend (herbicide and/or mechanical) stands to release conifer component Retain some deciduous component to reflect DC standard where applicable
						DC 800 SPH		
					Straight plant DC 800 SPH	None	None	
					<ul style="list-style-type: none"> ➤ Pure D 	LFN	None	None

* Switch stands are assumed to return to understorey Broad Cover Group (BCG) and 'C' Crown Closure



Regenerating Stand Objective					Regenerated Stand Treatments			
					Establishment		Maintenance	
Yield Stratum	Inventory Species Group	Site Class	Crown Closure	Estimated 10 year Area (Hectares)	Stand condition	Tactics	Stand conditions	Tactics
31, 32, 33, 34	Deciduous Dominated D and DC Upper Foothills	Good	A, B, C, D		➤ Mixedwood DC	Site prep and plant conifer in selected areas DC 800 SPH	Where conifer crop trees exist competition is great enough to cause concern that survival or performance may be jeopardized	Tend herbicide and/or mechanical stands to release conifer component. Retain some deciduous component to reflect DC standard where applicable
						Straight plant DC 800 SPH		
					➤ Pure D	LFN	None	None
35	Deciduous Dominated D and DC Lower Foothills And Upper Foothills	Poor	A, B, C, D		➤ Mixedwood DC	Site prep and plant conifer in selected areas DC 800 SPH	Where conifer crop trees exist competition is great enough to cause concern that survival or performance may be jeopardized	Tend herbicide and/or mechanical stands to release conifer component. Retain some deciduous component to reflect DC standard where applicable
						Straight plant DC 800 SPH		
					➤ Pure D	LFN	None	None



Regenerating Stand Objective					Post Harvest Treatments	
					Primary Species	
Yield Stratum	Species Group	Site Class	Crown Closure	Estimated 10 year Area (Hectares)	Site Condition	Tactics
In-block Temporary Roads	C, CD, DC and D Lower Foothills Upper Foothills Sub Alpine	Good Medium Poor	A, B, C, D	Approximately 2.8% of all areas included in strata 1 through 35	➤ Hauled during non-frozen period: Pure C and Mixedwood DC/CD	Decompact and/or roll-back and plant or seed with conifer 1400 SPH
					➤ Hauled during frozen period: Pure C and Mixedwood DC/CD	Roll-back and plant or seed with conifer 1400 SPH
					➤ Hauled during non-frozen period; pure D	Decompact and/or roll-back and plant or seed with conifer 1400 SPH
					➤ Hauled during frozen period; Pure D	Roll-back and LFN or plant with conifer 1400 SPH

General Comments to Silviculture Strategies Tables

1. Conifer species planted currently are SW and PL.
2. Four seed zones cover the FMA. Seed storage amounts for white spruce and Lodgepole pine are adequate to support reforestation activities for a ten-year period.
3. Crown Closures are assumed to transition all to 'C' density.
4. Site Prep, other than drag, is expected to raise the planting bed (mounding).
5. Reforestation of in-block temporary roads will be consistent with the "Monitoring Protocol for the Establishment and Growth of Trees on Temporary Roads upon the Weyerhaeuser Pembina (Edson and Drayton Valley) FMAs."



Weyerhaeuser

DFMP 2000-2015
December 2005



APPENDIX 6-2

MONITORING PROTOCOL FOR THE ESTABLISHMENT AND GROWTH OF TREES ON TEMPORARY ROADS UPON THE WEYERHAEUSER PEMBINA (EDSON AND DRAYTON VALLEY) FMA'S





**Monitoring Protocol
for the
Establishment and Growth of Trees
on Temporary Roads
upon the Weyerhaeuser Pembina
(Edson and Drayton Valley) FMA's**

March 17, 2005

Approved April 29, 2005 by Robert Stokes

Revised February 2, 2006

Background:

Weyerhaeuser temporary in-block roads make up approximately 2.8% of cut block area in both of the Pembina FMA's (Sept. 22, 2004 – Robert Stokes).

Since the early 1990's, Weyerhaeuser has reclaimed, de-compacted, rolled-back, and where necessary, planted or seeded these roads to promote regeneration throughout the cut block. Under current direction from SRD, the Annual Allowable cuts for timber operators within these FMA's will be reduced by a corresponding amount (2.8%), unless they agree to the following proposals (Sept. 22, 2004 - Stokes):

- 1. Provide monitoring criteria and monitor to measure the early establishment of regeneration on temporary roads,**
- 2. Provide monitoring criteria and monitor to measure the growth of established seedlings on the temporary roads, and**
- 3. Provide details of silvicultural strategies to be used to reclaim roads in the "Silviculture Strategy Table" provided to Weyerhaeuser on March 12, 2004.**

The following outlines strategies to complete the above requirements.

Intent #1: To monitor the stocking level of regeneration upon temporary roads within cut blocks on the Edson and Drayton Valley FMA's.

Trees established along the transition zone between the road and block will influence the growing space of both the block and the reclaimed road surface. At rotation age, crown canopy extent should occupy most of the growing space available, independent of whether the tree was directly growing on the road surface or is found in the transition zone. Established stocking on the road surface itself would further add to crown closure.

Sampling Strata: A total of eight (8) strata will be sampled on both FMA's. They include:

- Blocks operated under non-frozen conditions (skid clearance before December 1st in the operating year) X Broad Cover Groups – 1 X C, CD, DC and D = 4 strata
- Blocks operated under frozen conditions (skid clearance after December 1st in the operating year) X Broad Cover Groups – 1 X C, CD, DC and D = 4 strata



Sampling Intensity: Weyerhaeuser and the established timber operators will undertake a 100% sample of all blocks undergoing an establishment survey during 2005 and 2006 as follows:

- Plots falling on roadways will be uniquely (with an 'R') identified. To be identified as a 'R' plot, the plot center **must** fall on the road surface, subject to the surveyor's interpretation during the survey. All trees falling within plots with the plot centre on the road will be tallied to reflect stocking on the road, whether they are physically on the road or adjacent to the road.
- Estimate # plots contributing to analysis is = 600 blocks X 64 plots per block X .028 = 1075 plots

Data Analysis:

- All 'R' plots will be dumped into the 8 individual strata.
- Upon completion of surveys in the initial year, simple t-test to test the difference between strata or "equivalence tests" will be carried out.
- Problems encountered during the first survey season will be addressed to provide direction to the 2006 sampling year. Weyerhaeuser and established timber operators are expected to fulfill this commitment for 2006.
- At the end of two years, data will be summarized by the strata as described above.

DFMP Implications:

- Results, if required, may be used to indicate impacts on AAC for the next (2007+) DFMP

Intent #2A: Weyerhaeuser to monitor the growth of established seedlings upon reclaimed temporary roads within cut blocks on the Edson and Drayton Valley FMA's using the PSP program.

Sampling Strata:

- No pre-stratification will occur
- The proposed monitoring program for regenerating stands will see plots established on a grid basis
- Some of the plots will fall on portions of reclaimed road surfaces if and when the grid allows

Data Analysis:

- Information from these "roadway" plots will be weighted to the area of roadways found within the strata and accounted for in future yields

Intent #2B: Weyerhaeuser to monitor the growth of established seedlings upon reclaimed temporary roads within cut blocks on the Edson and Drayton Valley FMA's with designated experiments.



Background

Dr. Dave McNabb has completed a research project that collected growth information that tested the planting of pine seedlings on in-block temporary roads that were either 1) ripped, 2) rolled back, or 3) ripped and rolled back in the early 1990s. Data was collected in the fall of 2004, and is currently being compiled into a report, scheduled for completion in the spring of 2005.

Expanded Research Proposal:

Dr. McNabb will work with Weyerhaeuser silviculture professionals in defining the bounds of the expanded research proposal that will be scientifically sound.

Weyerhaeuser is committed to the establishment of 4 additional replicated sets of plots, for a total of 5 (including the previously described plots established by McNabb) no later than the end of 2006. The purpose of these plots is to assess the growth response of operational treatments. Therefore the experimental design will be limited to those treatments currently used for road reclamation and control plots.

Intent #3: The Detailed Forest Management Plan to provide details of silvicultural tactics to be used to reclaim roads and decking areas in the “Silviculture Strategy Table” provided to Weyerhaeuser on March 12, 2004.

Weyerhaeuser will insure that the table will include the selected tactics. In general, the tactics are as follows:

- Temporary roads hauled on during non-frozen periods of the year will be de-compacted, and/or rolled back, and planted or seeded where necessary.
- Temporary roads hauled on during frozen periods of the year are rolled back, and planted or seeded where necessary.

We appreciate your review and acceptance of these protocols for inclusion into both the Edson and Drayton Valley DFMP’s currently being compiled for resubmission.

Paul Scott
Forest Management Planner
Pembina Forestlands
Edson





APPENDIX 6-3

STAND LEVEL ECOLOGICAL GUIDELINES





APPENDIX 6-4

DRAYTON VALLEY FMA
STAND LEVEL RETENTION MONITORING REPORT:
1999-2004





APPENDIX 6-5

FOURTH-ORDER WATERSHED CALCUATIONS





Watershed Analysis Re: Water Yield Increases

Introduction

The need to assess the potential of forest harvesting to increase water flows is identified as an indicator and goal in the recent draft of “Alberta Forest Management Planning Standard” released by Alberta Sustainable Resource Development (ASRD 2005) for public comment. The protection of water and water related resources are identified as a “performance standard” with the objective of limiting the impact of timber harvesting on water yield and water quality. The document states that,

“The impacts on water yield must be predicted. Watershed modeling and analysis will determine an acceptable target for water yield increase following harvesting for third order watercourses. The ToR (*Terms of Reference*) will describe the models to be used and assessments to be completed.”

Many forest companies are already addressing these issues in their Detailed Forest Management Plans, even though specific models, methods and targets are not fully established. To date such issues are reconciled between forest companies and ASRD on a one-to-one basis.

Objectives

The objective of this document is to describe and provide a scientific basis for the protocol developed by Weyerhaeuser Canada Ltd to identify and analyze watersheds to limit any “negative” effects of forest harvesting on water and water related resources.

Watershed Analysis Protocol

The protocol consists of five steps.

Step 1. All fourth order watersheds in the FMA will be screened to determine if the combined percentage of coniferous stands < 35 years old and deciduous stands < 20 years old equals or exceeds 40% of total watershed area.

Step 2 If the combined percentage for coniferous and deciduous species exceeds 40%, the ECA-AB model (Silins 2003), which simulates increases in annual water yield and hydrologic recovery as a function of the growth of forest regeneration.

Step 3 If simulated increases in annual water yield exceed 20%, the harvest plan will be modified, or further analyses will be conducted.



Step 4 Further analyses would use the Wrenss model (Water Resource Evaluation of Non-Point Silvicultural Sources), which provides a more in depth analysis of potential increases in water yield and peak flows.

Step 5 If a Wrenss analysis still indicates increases in annual water yield are > 20%, harvest plans will be modified.

Justification for Protocol

The protocol proposes an ECA analysis will only be done for a watershed when 40% of its area contains coniferous and deciduous stands less than 35 years and 20 years in age respectively. Step 1 assumes that significant increases in annual water yield occur when more than 40% of a 3rd - 4th order watershed is cut, and that hydrologic recovery occurs for coniferous and deciduous stands at 35 and 20 years respectively.

The harvest limit of 40% is supported by the following information.

1. The potential to increase annual water yield is proportional to the area harvested in a watershed is well documented in the scientific literature (Bosch and Hewlett 1982). Reported increases in annual water yield vary from 0%-66%, with maximums occurring in climatic zones characterized by high annual precipitation and warm temperatures. Water yield increases documented in Canada are lower (Hetherington 1987), because of cooler temperatures and less precipitation. Increases in water yield usually occur within the first 1-2 years following harvesting, and then steadily decline with the regrowth of forest cover (i.e. hydrologic recovery).
2. A literature review of experimental watershed studies in a paper by Guillemette *et al* (2005) report that harvesting between 40%-50% of a watershed is sufficient to increase 2-year peak flows by 50%, which may result in changes in stream channel morphology and aquatic habitat. The authors in their conclusions stated that more research is needed to confirm the link between increased peak flows and changes in aquatic habitat.
3. Verry (2004) in a retrospective study of the effects of forest cover removal for agricultural development in the Midwestern U. S. also cites increases in the 2-year event as a factor causing changes in stream channel morphology and aquatic habitats. Such changes in stream channel morphology are usually gradual in nature possibly taking 60-100 years to become apparent.

The use of stand ages of 35 years and 20 years for coniferous and deciduous stands as indicators of full hydrologic recovery are based on stand leaf area (i.e. LAI - leaf area index). As LAI increases with growth of forest regeneration so does evapotranspiration and interception leading to a decrease in the volume of extra water generated by forest cover removal. Hydrologic recovery is assumed to be complete at the time of peak LAI for a stand.



1. Research by Lieffers *et al* (2002) in Alberta shows the time to maximum leaf area (LAI) for aspen dominated mixedwood stands varies from 15-25 years for fair to good sites.
2. Recent work by Brabender (2005) shows maximum LAI for lodgepole pine occurs somewhere between 27-35 years.
3. Further work is needed to characterize these relationships for white spruce and black spruce. Given their growth habitats time to maximum leaf area will be greater than that for aspen and pine.
4. Peak LAI for white spruce and black spruce may occur at of 40-50 years and 60-80 years may apply to white spruce and black spruce. These estimates are based on a strong relationship between volume growth and LAI (Brabender 2005).

In Step 3 an increase in simulated annual water yield $\geq 20\%$ is used as a trigger to either modify existing harvest plans or to conduct further analyses. The selection of 20% as a limit was based on an analysis of the natural variability of annual water yield and peak flows (Watertight Solutions, 2005), a regression of simulated increases in annual water yield on percent area of watershed harvested and results from experimental watershed studies.

Natural Variability

1. The analysis of natural variability of flows was done for the Grande Cache-Grande Prairie region. Flow data for 18 watersheds, with a length of record ≥ 10 years, in and adjacent to Weyerhaeuser Canada's FMA were used in the analysis. Natural variability for each watershed was defined as the average annual water yield ± 2 standard deviations. $\{\%NV = ((2 \times \text{std}/0) \times 100)\}$. This statistical approach was adopted as there are no standards or guidelines regulating the effects of forest harvesting on water flows and definitive data linking changes in flow to aquatic habitat do not exist.
2. Natural variability with respect to increases in annual water yield was defined as $(0 + 2 \text{ std})$. This definition includes the full range of variation above the mean flow associated with extreme hydrologic events and natural disturbances such as fire, insect and disease infestations.
3. Natural variability for the 18 watersheds averaged $\sim 100\%$ (27%-145%) (Table 1), which greatly exceeds the potential effects of forest harvesting on water yield. Documented increased water yields following logging in Alberta range from 6% to 27% (Swanson and Hillman 1977; Swanson *et al* 1986).
4. The limits of natural variability for the 18 watersheds were used as a starting point to identify possible limits on increases in water yield. The values for full natural variability for each watershed were systematically reduced into multiples of $(0 + 1 \text{ std})$, $(0 + 0.5 \text{ std})$, $(0 + 0.33 \text{ std})$, and $(0 + 0.25 \text{ std})$. The maximum



water yields identified by these reduced limits were then determined and described by their recurrence intervals²² to identify “acceptable” increases in water yield (Table 1).

5. Recurrence intervals were used to identify “acceptable” increases by magnitude and frequency of occurrence. The effects of forest harvesting on water yield and peak flows are more pronounced for hydrologic events with recurrence intervals of 2-10 years. The effects of forest harvesting on more extreme events (> 10 years) are usually small to nil (i.e. undetectable).
6. Average percent increases for the 18 watersheds were 47% for 0+1 std, 23.6% for 0+0.5 std, 15.6% for 0+0.33 std and 11.80% for 0+0.5 std (Table 1). Recurrence for the same categories were 6.7 years, 4.2 years 3.7 and 3.4 years respectively. The three lower categories are considered most “acceptable” at they target water yields with recurrence intervals of 3-4 years.

Regression Analysis

An alternative approach to identifying “acceptable” increase in annual water yield was a regression analysis of simulated water yield increases on percent area harvested in a watershed. The simulated water yields were obtained from a history of simulations done for forestry companies by Watertight Solutions Ltd. using WrnsAB2K.

1. The watersheds used in the analysis range in size from very small to large and cover a range of different forest cover types in Alberta (boreal and foothills).
2. Harvesting in most of the simulation runs was less than 40% of watershed area, with water yield increases averaging 6% with minimum and maximum values of 1.4% and 12%.
3. The regression curve indicates that harvesting 60%-80% of a watershed could increase maximum annual water yield by 15%-20%. These values should be viewed with some caution as the number of data are less for this part of the curve and the data points were for long term simulations where harvesting was frequent and affected 70-90% of watershed area.
4. Another point to acknowledge is that the regression analysis includes only maximum annual increases in water yield, which does not fully reflect the effects of snow redistribution and the potential for snow scour (i.e. sublimation) on harvest blocks. The inclusion of these effects could increase water yield responses.

²² Recurrence interval or return period expresses the average frequency that an event of given size can be expected to occur. For example, the 2-year peak flow on average will occur once every two years. Another way of expressing this is that in any given year the 2-year peak flow has a 50% chance of occurring. In contrast the 25 year peak flow has a 4% chance of occurrence in any given year. On a longer time frame the 2 year event can be expected to occur 50 times in 100 years and the 25 year event only 4 times in 100 years.

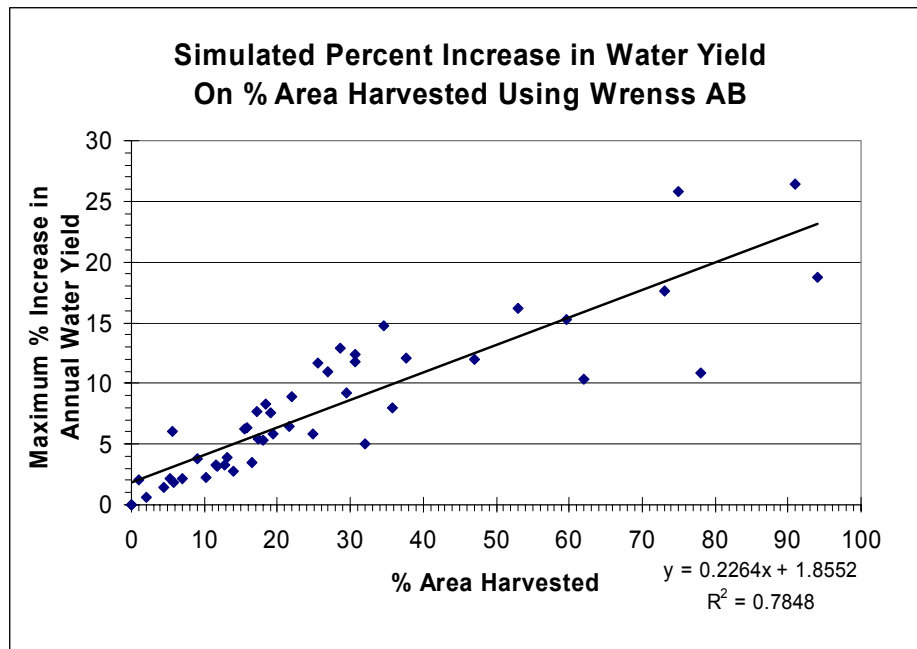


Table 6 Natural variability and possible percent increases in annual water yield based on multiples of natural variability (0+2 std) and average recurrence interval for each category (source “Variability of Precipitation and Streamflow, Grande cache-Grande Prairie and Discussion of Guidelines for Water Yield and Peak Flow Increases, Prepared for Weyerhaeuser Canada Ltd., Grande Prairie by Watertight Solutions Ltd. March 2005).

Watersheds	%Natural Variability (0+2 std)	Percent Increases in Annual Water Yield based on Natural Variability			
		0+1 std	0+0.5 std	0+0.33 std	0+0.25 std
Simonette River near Goodwin	71.42	37.71	17.85	11.78	8.93
Smoky river Hells Gate	27.23	13.61	6.81	4.49	3.40
Kakwa River near Grande Prairie	58.25	29.12	14.56	9.61	7.28
Wapiti River near Grande Prairie	59.87	29.94	14.97	9.88	7.48
Red Willow near Beaverlodge	111.56	55.78	27.89	18.41	13.95
Cutbank River near Grande Prairie	73.33	36.67	18.33	12.10	9.17
Muskeg River near Grande Cache	71.30	35.15	17.57	11.60	8.79
Deep Valley near Valleyview	70.10	35.05	17.52	11.57	8.76
Saddle River near Woking	138.01	69.01	34.50	22.77	17.25
Pinto Creek near Grande Prairie	101.46	50.73	25.36	16.74	12.68
Grande Prairie Creek Sexsmith	144.84	72.42	36.21	23.90	18.10
Spring Creek near Valleyview	135.19	67.59	33.80	22.31	16.90
Little Berland near Grande Cache	78.09	39.04	19.52	12.88	9.76
Upper Spring Creek near Valleyview	127.59	63.79	31.90	21.05	15.95
Bridlebit near Valleyview	133.67	66.84	33.42	22.06	16.71
Rocky Creek near Valleyview	142.52	71.26	35.63	23.52	17.81
Wolverine Creek near Valleyview	98.30	49.15	24.57	16.22	12.29
Horse Creek near Valleyview	117.26	58.63	29.32	19.35	14.66
Average Percents	97.72	47.22	23.61	15.58	11.80
Average Recurrence Intervals - Years	18.42	6.71	4.19	3.69	3.41



Figure 4 Regression of simulated maximum annual increases in water yield on percent area of watershed harvested. Simulated increases were obtained from a series of simulations done in Alberta for watersheds varying in size from small to large (1 – 350 km²). The analysis indicates that harvesting 60%-80% of a watershed could increase maximum annual water yield by 15%-20%.



Experimental Watershed Studies

The results from experimental watershed studies report increases in annual water yield ranging from 0% to 66%. The wide range in these results is a reflection of differences in climate (precipitation and energy), forest cover types, soils (i.e. soil water storage) and treatments. These studies are usually conducted on very small watersheds (2.5-7.5 km²) with treatments that in most cases removed 100% of the forest cover in a short period of time (1 season). The intent of many of these studies was to confirm the effects of forest cover removal and were done to seek the maximum effect.

Direct extrapolation of these results to forest harvesting operations must be done with care. Harvesting planning is usually done at a larger scale (3rd-4th order watersheds) and seldom if ever will a watershed be fully harvested in 1-2 seasons. There are only a few watershed studies where different levels of forest cover removal and long-term post harvest evaluations (i.e. cumulative effects) are evaluated.



Conclusions

In conclusion the protocol proposed by Weyerhaeuser Canada should be an effective method for screening harvest plans for 3rd-4th order watersheds to prevent water yield increases above “acceptable” levels. Using 40% of watershed area with coniferous and deciduous stands of ages ≤ 35 and 20 years in age to trigger an ECA-Alberta analysis should be effective in detecting and preventing water yield increases greater than 20%. The regression analysis shown in Figure 1 indicates that most water yield responses at $\leq 40\%$ harvest level will be less than 12%.

The study of water flows in the Grande Cache-Grande Prairie area show annual water yield increases of 15%-20% fall within the range of natural variability and target annual water yields with recurrence intervals of 3-4 years, which are slightly above “average” conditions represented by the 2-year flows.

Improvements to this protocol and those of other companies undoubtedly will occur as better information and understanding of the hydrology of forested watersheds and hydrologic recovery become available. In particular, the development of “acceptable” flow increases for forest regions within the province (e.g. foothills versus boreal), better leaf area data for white and black spruce cover types, and flow data for headwater 3rd and 4th order watersheds.

Richard L. Rothwell RPF 150
Watertight Solutions Ltd
Suite 200 10720 113 Street
Edmonton, Alberta T5H 3H8
780 413 9175

Literature Cited

Alberta Sustainable Resource Development. 2005. Alberta Forest Management Planning Standard. ASRD. Public Lands and Forest Division. Forest Management Branch. Version 3 June 2005. http://www3.gov.ab.ca/srd/forests/managing/planning_rules.html

Bosch J. M., Hewlett J. D. 1982. A review of catchment experiments to determine the effect of vegetation changes on water yield and evapotranspiration. *J. Hydrology* 55:3-23.

Guillemette, A. P. Plamondon, M. Prévost, D. Lévesque. 2005. Rainfall generated stormflow response to clearcutting a boreal forest: peak flow comparison with 50 world-wide basin studies. *J. Hydrology* 302 (2005) 137-153.

Lieffers V.J., B.D. Pino, K.J. Stadt. 2002. Light dynamics and free-to-grow standards in aspen dominated mixedwood forests. *Forest Chronicle* vol. 78, No. 1.



Hetherington E. D. 1987 . The importance of forests in the hydrological regime. In: Canadian Aquatic Resources Eds: M.C. Healy and R.R. Wallace. Can. Bull. Fish Aquat. Sci 251:533.

Verry E.S. 2004 Land fragmentation and impacts to streams and fish in the Central and Upper Midwest. In: A Century of Forest and Wildland Watershed Lessons. Eds; G. C. Ice and J. D. Stednick. Society of American Foresters 1`55-168.

Silins U. 2003. An integrated forest-watershed planning and assessment model: "ECA-Alberta". Centre for Enhanced Forest Management, Department of Renewable Resources. EFM Research Note 07/2003.

Swanson R. H. and G.R. Hillman. 1967. Predicted increased water yield after clearcutting verified in west-central Alberta. Can. For. Serv. Inf. Rep NOR-X-198. 40 pg.

Swanson R. H., D.L. Golding, R.L. Rothwell and P.Y. Bernier. 1986. Hydrologic effects of clear-cutting at Marmot Creek and Streeter watersheds, Alberta. Can. For. Serv. Inf. Rep NOR-X-278. 27 pg.

Watertight Solutions. Ltd 2005. Variability of Precipitation and Streamflow, Grande Cache-Grande Prairie and Discussion of Guidelines for Water Yield and Peak Flow Increases. Prepared for Weyerhaeuser Canada, Grande Prairie, Alberta by Watertight Solutions Ltd.



APPENDIX 6-6

GUIDELINES FOR INTEGRATING TIMBER HARVESTING AND DOMESTIC GRAZING IN THE GREEN AREA

