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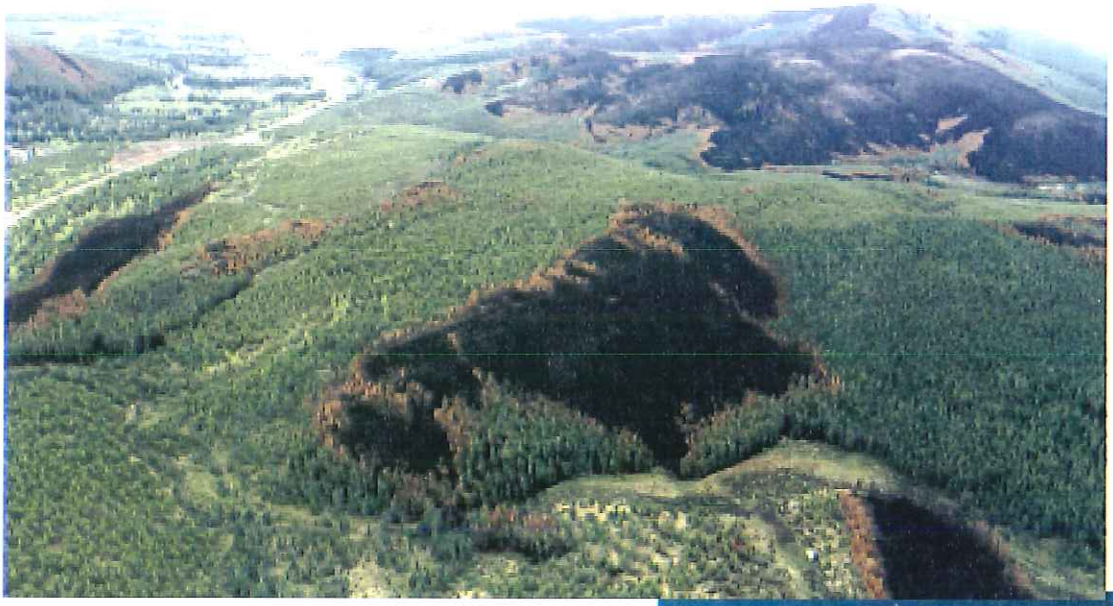
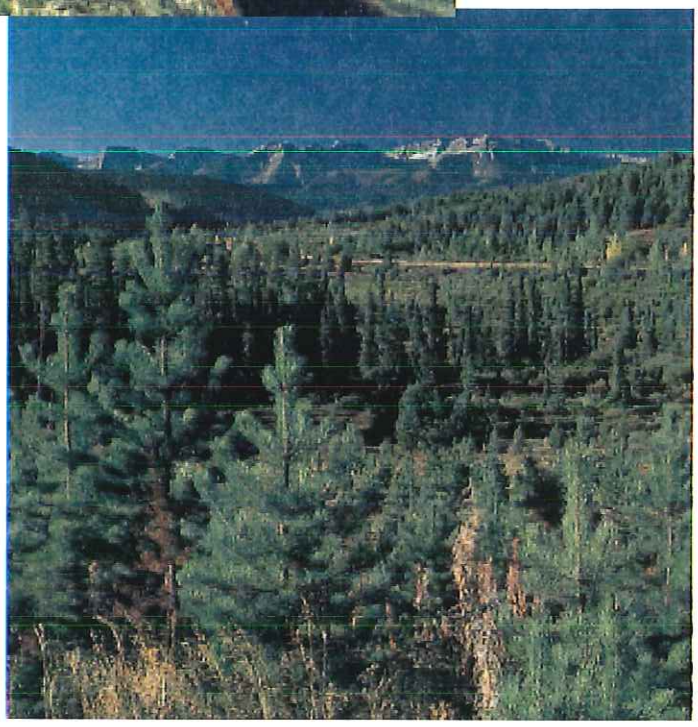
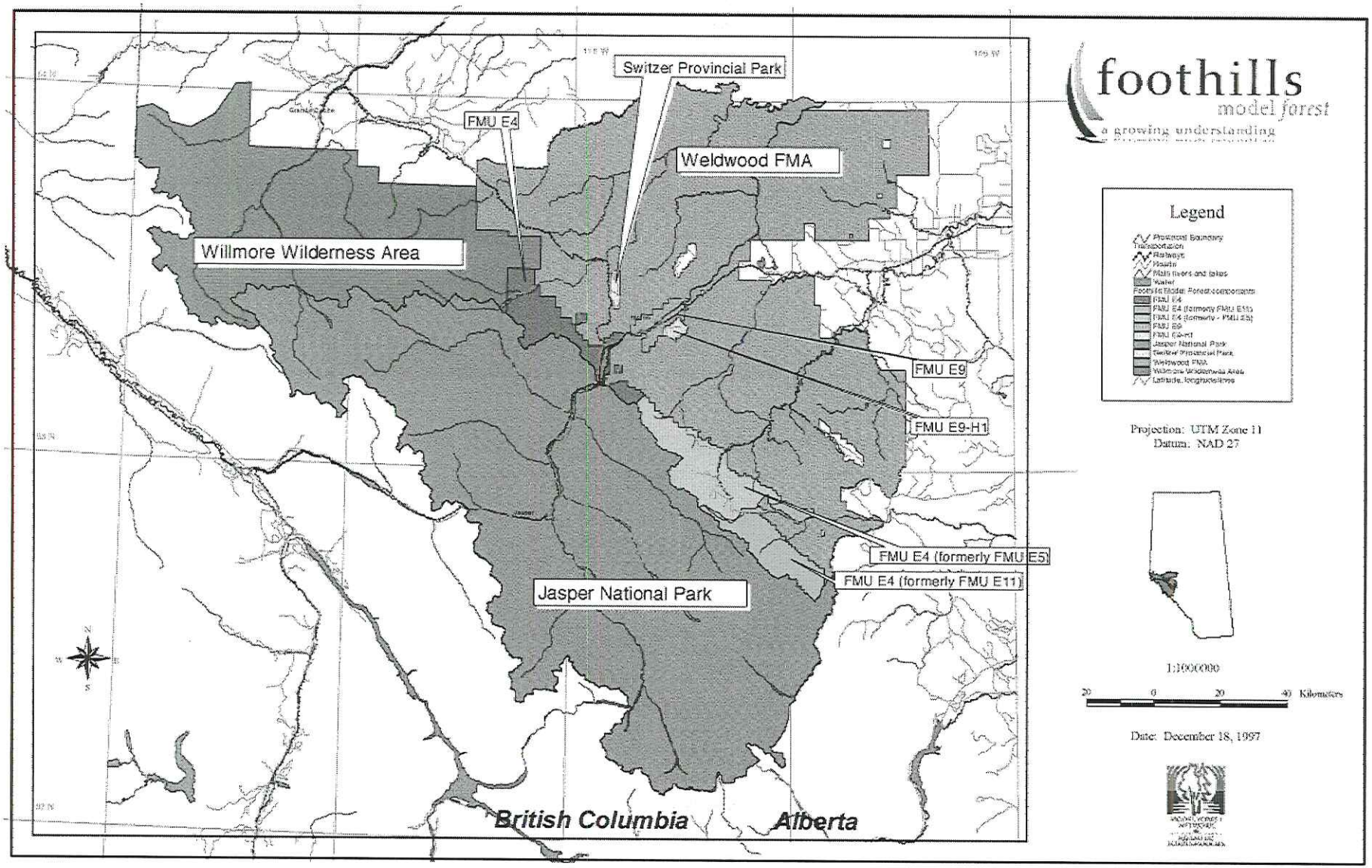




# German State Parliament Tour

June 9, 1998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Switzer Provincial Park
FMU E4
Weldwood FMA
Willmore Wilderness Area
FMU E9
FMU E9-H1
FMU E4 (formerly FMU E5)
FMU E4 (formerly FMU E11)
Jasper National Park
British Columbia
Alberta
Legend
Projection: UTM Zone 11
Datum: NAD 27
1:1000000
20 0 20 40 Kilometers
Date: December 18, 1997

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**Joint Foothills Model Forest/Weldwood of Canada Limited Program Itinerary for German State Parliamentarian Visit**
**Tuesday, June 9, 1998**

**Hosted by Robert Udell (Weldwood) and Rick Blackwood (Foothills Model Forest)**

**12:30 p.m.** – Lunch in Edson, hosted by Ivan Strang (MLA) – 7 tour participants confirmed from Weldwood/Foothills Model Forest

**2:30 p.m.** – Depart Edson for Foothills Model Forest (via Hwy 47/Robb Road) Tour guides will accompany tour directly from Edson to allow for background questions

**3:30 p.m.** – Stand tending/cleaning work (Fox Creek Development Association and Weldwood of Canada Limited)

**4:30 p.m.** – Riparian area management/biodiversity/watershed issues (Gregg River – Weldwood of Canada Limited/Foothills Model Forest)

**5:15 p.m.** – Reforestation/silvicultural program site (Weldwood of Canada Limited/Foothills Model Forest)

**5:45 p.m.** – Tour departs for Gregg River Cabin Site

**6:00 p.m.** – Tour concludes, barbecue at Gregg River Cabin (hosted by Weldwood of Canada Limited)

- Welcome to delegation by Dennis Hawksworth (Vice President of Hinton Forest and Wood Products, Weldwood of Canada Limited, Hinton Division)
- Thank you to host by Ivan Strang (MLA, West Yellowhead)
- Thank you to host by German delegate
- Thank you on behalf of Legislative Assembly and presentation to host (Hon. Ken Kowalski, Speaker)

**6:10 p.m.** - Barbecue begins - discussion over dinner on the role of natural disturbance in shaping the forest and related Foothills Model Forest research program (December, 97 fire site easily visible from the Cabin itself). This presentation will take place after the meal has concluded. (Please note that the Gregg River Cabin is a historic site and is, as such, quite rustic. Both the barbecue and presentation will be in an open-air setting with a tent provided in case of inclement weather).

**7:00 p.m.** – Tour departs Gregg River Cabin for Jasper via Hwy 40/Hwy 16

**8:00 p.m.** – Arrive Jasper

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# Stand Tending – Fox Creek Development Association

**MCLEOD 9 Block 501-4-9**

**A) Site Description**

**B) History**

Block 501-4-9 27 ha

1972 - Harvested
1974 - Scarified with Crossley Plow
1982 – Last regeneration survey completed, found to be 88% stocked

**C) Harvesting and Timber Management**

This site was identified as a site which could benefit from stand tending activities.

- The pre-stand tending prescription identified 6 ha to be tended by brushwas and 17 ha required girdling.
- The competing vegetation is aspen (5-6 meters high) and alder/willow (1-2 meters high). Both are rated as medium on the prescription. It is the aspen competition which is the limiting factor on the block. The grass competition is rated as low on the prescription.
- The average crop tree height is 4-5 meters for the Lodgepole pine and 3-4 meters for the Spruce. The Lodgepole pine is the dominant species in the block.

**D) Fox Creek Development Association**

In 1972, the company (now Weldwood) helped set up the Fox Creek Development Association as a native logging co-operative, and has worked with it for the past 25 years. The co-operative employs status and non-status natives, and metis people from the local area. In recent years, Fox Creek has moved into silviculture contracting. Among other activities, a 20 person crew manually cleans competing hardwood species such as aspen and poplar from around young softwood regeneration (spruce and lodgepole pine) on Weldwood's reforestation areas. They treat about 2400 hectares of Weldwood's FMA each year in this manner. Fox Creek employees also work on Weldwood's recreation program conducting maintenance on various recreation sites and trails.

George Callihoo who first served on the Fox Creek board of directors in 1974 and is a member of the board today says "We started this co-operative so that as many of our people as possible would have an opportunity for work to support themselves and their families. This is still our goal and for that reason we have tried to build a business in jobs that require manpower, rather than high technology machinery. Our people take pride in the quality of the work they do, and they are respected for it."

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# Natural and Planted Lodgepole Pine Regeneration

**MCLEOD 7 Block 33 and 118**

**C) Site Description**

**D) History**

Block 33 122.1 ha

1973 - Manual logging - Cable skidder.
1973 - Scarified with drags.
1987 - Thinned with brushsaws.

Block 118 18.5 ha

1987 - Feller-buncher logging, grapple skidder.
1987 - Scarified with drags.
1990 - Planted with lodgepole pine

**C) Harvesting and Timber Management**

Cutblocks are normally harvested in a 2-pass, alternate-cut pattern. The second pass cut in this area was in 1982, after regeneration in the initial cuts reached 2m in height. The more recent cut in Block 118 made use of small diameter wood deferred beyond the normal 2-pass sequence. The small patches and fringe wood to the south are too small for economic harvest with present systems. The Company is investigating methods to economically recover wood fibre from these areas.

The 25-year-old stand in block 33 may be logged again in 2063. By then, the age 80 trees should be much larger than the age 110 fire-origin stand logged in 1973.

**D) Fertilization**

Fertilization is a means of increasing forest biological productivity. Block 33 was thinned in 1987 and has since undergone a manual fertilization treatment in the spring of 1997. The fertilizer was applied at a predetermined rate using a hand-held "cyclone" dispenser. The reason for the fertilization was to provide a demonstration area to the public that is representative of some of Weldwood's research elsewhere on the FMA. The objective of the fertilization is to get an overall increase in volume as well as to speed up the stand differentiation amongst individual trees.

In the spring of 1997, Weldwood established a series of operational and research fertilizer trials on the FMA. The focus of these trials is to quantify the results of various types of fertilizer treatments for operational use in the Foothills of Alberta. The potential gains from this type of treatment need to be evaluated. Based on the findings, fertilizers may become an important management tool for Weldwood in the future.

The addition of fertilizer in this particular pine stand will improve the overall vigor of the trees. The first signs of improvement will be seen in the fall. By this time, the foliage will be dark green in color which is a direct response to the addition of nutrients. A variety of fertilizers were applied to the stand in controlled amounts and in predetermined areas. The main ingredient in the different fertilizers was nitrogen which is considered to be the primary limiting nutrient in the Foothills of Alberta. The nitrogen was applied in various combinations which ranged from a complete blend of nutrients to nitrogen alone.

Refer to map to reference location of the individual plot(s).

| Plot | Fertilizer (Urea = Nitrogen) | Area (hectares) |
|---|---|---|
| **1** | Urea + complete blend (spring) | 0.35 |
| **2** | Control | 0.35 |
| **3** | Urea + Borate (spring) | 0.35 |
| **6** | Ammonium Nitrate + Borate (spring) | 0.35 |
| **5** | Urea + Borate (fall) | 0.35 |
| **8** | Urea + Borate (spring) | 0.35 |
| **7** | Urea (spring) | 0.35 |
| **4** | Ammonium Nitrate + Borate (spring) | 0.35 |

**E) Wildlife Habitat**

Thinning of pine in Block 33 also rejuvenated willow and other deciduous shrubs, providing moose browse in good cover. Thinning also promotes growth of herbaceous plants eaten by mule deer.

This stand is old enough to again have red squirrels - also snowshoe hares, lynx, and robins. As it ages, other species such as marten and hermit thrush will also come back. As an area is harvested, changes in furbearer populations associated with habitat changes occur. There will be fewer marten, fisher, and red squirrels until regenerated stands develop into suitable habitat. However, species such as lynx, coyote, and weasel will increase in number as areas of regenerated stands (these provide their preferred habitat) increase. At any time, furbearers will be available to support a trapping industry, provided trappers are willing and able to flexibly respond to opportunities.

The new Block 118 cut is developing to the grass-herb stage, which is suitable for species like savannah sparrow, northern harrier, and meadow vole. Residual stands provide ungulate cover, a buffer to the Gregg River, and refuge habitat for species such as marten.

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# Riparian Zone Management

## McLeod 7

### A) Site Description

Site A: Upper Foothills f4 (bracted honeysuckle Sw) / j1 (horsetail Sw) ecosites
Site B: Upper Foothills e3 (tall billberry/arnica Sw) / f4 (bracted honeysuckle Sw) ecosites

### B) History

| | |
|---|---|
| Partial Cut: | Winter - 1991 |
| Site Preparation: | Spot treatment with excavator in 1995 |
| Planted: | White Spruce – Summer 1995 |

### C) Harvesting and Timber Management

River valleys, or riparian zones are sensitive areas. They provide multiple values that include water supply and quality, wildlife and fisheries habitat, recreation and timber. In recognition of this, our Harvest Planning and Operating Ground Rules identify special operating conditions near rivers and streams. Depending on the size of stream, conventional patch logging is not done within a certain distance.

This project, which used both horse logging and single grip, low ground pressure harvest systems, was an experiment to demonstrate ways of management for multiple use in sensitive areas. Seven areas with a variety of forest conditions were represented. In each area, logging was carefully fitted to the site to ensure tree removal protected other resource values. This includes small patch cuts, selection logging in spruce, retention of snags and deciduous trees for wildlife habitat, and operating during winter to reduce soil disturbance.

Following the harvest the area was left for natural regeneration. After it became apparent that this site would not regenerate naturally, it was planted with white spruce.

Interestingly, we found an old telephone line insulator in one of the younger trees in this area - it had been nailed to the tree about 1925. One possible reason for the younger trees in these stands is previous logging, perhaps 55 years ago. This would explain the presence of some old trees and dense regrowth of younger spruce.

### D) Wildlife Habitat

This stand is currently being used by many wildlife species associated with old-growth spruce forest, including pileated woodpecker, brown creeper, varied thrush, marten and mink. It also provides winter cover for white-tailed deer. All of these species were present prior to harvest.

Opening the stand has retained many of the structural habitat features required by the species that used the stand previously. In addition, the quality of deer winter range was improved as food

plants responded to the increased light on the forest floor. Wildlife species that specialize in open forest stands found the new conditions attractive - these include kestrel, and olive-sided flycatcher which were found after but not before the harvesting.

River valleys such as this one have very high value for wildlife, and must be managed to retain that value. They represent about 5% of the landbase of the F.M.A. Weldwood recognizes the need to develop innovative ways to do this. In a biodiversity management strategy, for instance, they may provide the corridors of connectivity, or landscape level linkages between ecosytems.

**E) Future Studies**

Building on the experience of the Gregg River Demonstration area, we are designing a more rigorous system of trials to examine various options for stand management. The key priorities will be to manage the area to:

- retrieve fibre/ maintain contribution to the AAC
- retain visual quality from the river
- maintain wildlife habitat presently supplied
- improve reforestation effectiveness
- study wildlife response to different management strategies

Planning has already begun on the design of the first trials which are to take place about 5 km downstream from this location in McLeod 20.

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# Ecological Assessment of a Riparian Area (Site A)

**Natural Subregion:** Upper Foothills

**Ecological Classification:** Complex: f4 bracted honeysuckle Sw / jl horsetail Sw

**Plant Species Present:** f4: white spruce, balsam poplar, rose, buffaloberry, river alder, salix, twinflower, palmate-leaved coltsfoot, horsetail, various grass species
j1: white spruce, balsam poplar, salix, river alder, bracted honeysuckle, horsetail, various grass species, feathermosses

| **Site Characteristics** | f4 | j1 |
|---|---|---|
| **Moisture Regime:** | mesic | subhygric- hygric |
| **Nutrient Regime:** | medium-rich | medium-rich |
| **Topographic Position:** | level | level-depressional |

**Soil Characteristics:**

| | | |
|---|---|---|
| **Humus Form:** | rhizomull | - |
| **Surface Texture:** | sand | - |
| **Effective Texture:** | sand | - |
| **Drainage:** | well | - |
| **Parent Material:** | fluvial | fluvial |
| **Soil Subgroup:** | Cumulic Regosol | - |
| **Soil Type:** | SM1 | - |

## ECOLOGICAL OVERVIEW

This riparian area is described as an f4/j1 complex. "Complexing", or forming a "compound unit" as it is sometimes referred, is a useful tool for mapping purposes. Complexes are most effectively used when they refer to a heterogeneous area consisting of two ecosites and when ecological units are too small to map as separate units. Precise geographical references are lost for each ecosite phase when complexing is employed but important ecological information is maintained. On this site, a complex unit exists because several factors are working together to influence its ecological variability. The major factors include:

1. water table fluctuations due to seasonal influences
2. the coarse textured soil
3 elevational variability
4. solar radiation variability

This riparian area adjacent to Gregg River is strongly influenced by changes in the water table level. It is expected that in the spring and during heavy rainfall periods, water table levels rise close to the surface supplying plant roots with an excess amount of moisture. Water periodically flows through this stand during flood periods. In the fall or during drought periods of the summer, water table levels recede and may temporarily limit plant water availability on higher elevational areas. The erosional and depositional effects of recent and old flood events cause elevational differences within the riparian area.

The coarse textured soil increases the degree of moisture variability along elevational gradients due to its poor ability to absorb, and to draw water up from greater depths. Consequently, low or depressional areas tend to be wet and are associated with the horsetail ecosite (j) while higher areas are moist and are associated with the bracted honeysuckle ecosite (f).

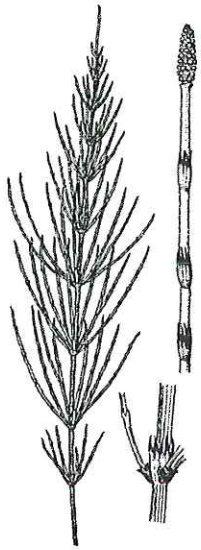
**River Alder**

Plant species composition on the bracted honeysuckle ecosite (f) component of this site is not typical because of the unique site and soil factors mentioned above.

Directly along the riverbank, high amounts of sunlight also influence plant species composition as noted in increased proportions of rose, buffaloberry, and grasses. River alder and several species of horsetail also occur along the exposed riverbank, but only in small quantities.

## MANAGEMENT INTERPRETATIONS

Shrub and grass competition is common on bracted honeysuckle and horsetail ecosites. Since these ecosites are typically moist to wet, and rich, once partial or complete canopies have been removed, the density of understorey plant growth increases.



**Common horsetail**

Site preparation within this riparian zone has created an ideal micro-climate for white spruce seedling growth. Exposed mineral surfaces offer the seedlings a chance to grow in an ideal location which is warm and free of intense competition for at least a portion of their most critical growth period.

Although carbonates occur in the lower coarse textured material, vegetation and other soil characteristics suggest that this site has a poor nutrient regime.

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# Historic Rates of Burn in Northern Alberta

Peter J. Murphy
Department of Forest Science
University of Alberta

The forests of northern Alberta have mostly originated after forest fires. Death of the old stands set the stage for quick regeneration of new forests by seeds or sprouting. Early seedling growth took advantage of the sunlight and nutrients which were made available. This ongoing cycle of alternating forest growth and forest fires is also recorded in lake-core sediment studies. Specks of charcoal are found at intervals in the deposits, starting to appear when the forest began to grow again after the retreat of the glaciers about 8000 years ago.

These fire-origin stands are called "even-aged" since most of the trees started to grow within the **first** few years after the earlier stand was burned. It follows, then, that the ages of forest stands **can tell** us a lot about the frequency and extent of fires in the past.

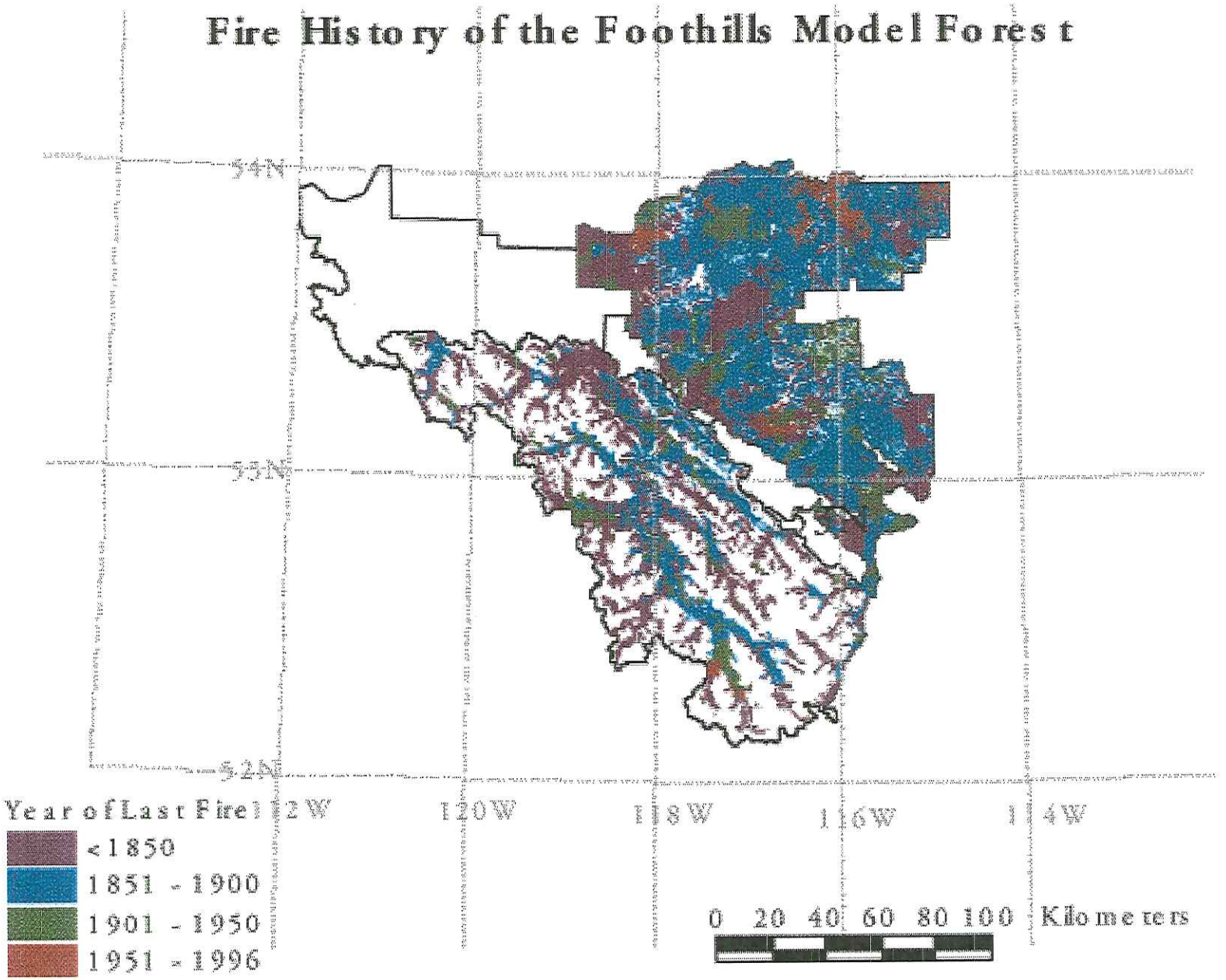
An analysis was done for the forests of northern Alberta to calculate their "fire cycles". The "fire cycle" tells us how long it would take to burn over an area equal to the area of the forest. For example, in a 1 million ha forest, a fire cycle of 40 years would mean that, on average, a total of I million ha of forest would burn within it in 40 years. Some areas might burn two or more times in this interval, and some might not burn at all, so the forest would have an extended range of stand ages. A large fire cycle figure means a low rate of burn.

Another way to describe the extent of fires is to calculate the average percent area burned each year.

The results of the analysis showed that back around the year 1910; the average rate of burn was about 2.5 percent per year, or a fire cycle of only 38 years. This represents a very high rate of burn, but illustrates how fires naturally affected extensive areas of forest. As of 1930 and 1950, the average rate of burn was reduced to around 2 percent (fire cycle 50 years). By 1970, improved forest fire fighting capability reduced the annual per percent burn to 0.26 percent, and the fire cycle increased to 380 years.

The analysis showed how the northern Alberta boreal forests have evolved under the strong influence of forest **fire,** and adapted to sustain themselves under these cycles of death and renewal. In a similar manner, forest management for timber harvesting is attempting to follow these cycles, but at longer intervals than the ones shown by earlier **fires.**

# Fire History of the Foothills Model Forest



# *FOREST MANAGEMENT HIGHLIGHTS WELDWOOD OF CANADA LTD. - HINTON DIVISION 1998*

In 1951, North Western Pulp and Power signed the first Forest Management Agreement (FMA) in the Province of Alberta. This FMA, a landmark in the history of forest policy development in Alberta, has been used as a model for other Canadian FMAs. In return for the right to harvest and manage timber from a 800,000 hectare FMA area, N.W.P.& P. assumed many resource management responsibilities traditionally held by the Provincial Government, while returning benefits to the Province in terms of infrastructure development, employment, tax base and royalties.

## *SIGNIFICANT DATES*

| | |
|---|---|
| First Forest Management Agreement signed | 1951 |
| Harvesting Began | 1956 |
| 91,000 tonne Kraft Pulpmill began production | 1957 |
| First Seedling planted | 1961 |
| Original Forest Nursery and Greenhouse opened | 1965 |
| 50 Million fbm Studmill opened | 1972 |
| First Development of Hiking Trails: Wild Sculpture Trail | 1973 |
| N.W.P.&P. became St. Regis (Alberta) Ltd. | 1978 |
| Studmill expanded to 70 Million fbm | 1981 |
| New Forest Nursery and Greenhouse opened | 1981 |
| Task Force on Forestry/ Wildlife Plan for FMA | 1982 |
| Champion Forest Products (Alberta) Ltd. | 1985 |
| Prototype Report on Forestry/ Wildlife Program for FMA | 1987 |
| Champion Forest Products purchased by Weldwood | 1988 |
| Weldwood of Canada Ltd. - Hinton Division | 1988 |
| New FM Agreement signed, FMA expansion | 1988 |
| Integrated Resource Management Steering Committee, First Biologist | 1988 |
| Opening of expanded Kraft Pulpmill (385,000 tonnes) | 1990 |
| 50 millionth seedling planted | 1991 |
| Model Forest Agreement Signed | 1992 |
| Hi-Atha Sawmill (230MM fbm) Began Operations | 1993 |
| Two New Biologists Hired for Hinton Division | 1994 |
| Joint Venture Company formed to manage Huallen Seed Orchard | 1994 |
| ForestCare Certification | 1997 |
| 90 millionth seedling planted | 1997 |
| 40$^{th}$Anniversary | 1997 |

## *FOREST TENURE / FOREST MANAGEMENT AGREEMENT*

The implementing Forest Management Agreement for the Forest was signed in 1954, and has been renewed twice. The most recent Agreement was signed in 1988 when the lease area was expanded from 800,000 ha to 1,012,000 in order to support the expansion of facilities in Hinton.

The responsibilities assumed by the Company, at its own cost, in return for the rights granted include:

- construction of processing plants to utilize the resources granted;
- initial development of, and 10 year revision of forest management plans to provide sustained yield forest management;
- inventory, growth and yield programs to support management plan and operational plans;
- development of all infrastructure (roads, bridges etc.) to carry out operations;
- progressive reforestation of all areas harvested, to a free growing status;
- participate in fire control with the Province.

The rights granted to the Company in return for these commitments include:

- security of tenure for 20 years, renewable;
- right to compensation for land withdrawals impacting AAC;
- ownership of the trees on the Agreement area;
- allowable annual cut increases arising from intensive management or better growth and yield information accrue to the Company;
- potential of "stumpage free" fibre for incremental AAC arising from intensive management;
- negotiated Operating Ground Rules with the Province.

## *MANAGEMENT PLANNING*

### Forest Management Plans and Annual Allowable Cut (AAC)

A forest management plan is prepared and revised every ten years. At this time a new management inventory is conducted, and the landbase dedicated to timber production is recalculated to take into account any reductions such as permanent roads, coal mines, seismic lines, licences of occupation recreation reserves, wildlife reserves or protective buffers along streams.

The growth characteristics of both the natural forest, which originated from forest fires, and the regenerated forest, which has been established by Weldwood, are tracked and documented through Weldwood's research program in forest growth and yield. This knowledge is applied to existing stand and age class distributions. Operating ground rules and strategies for integrate resource management are identified. A forest estate model (computer simulation program) takes this information and uses it to evaluate

sustainable levels of forest management activity by "growing" and "harvesting" and "reforesting" the area to be managed over a period of at least two full management cycles.

Since forest operations began in 1956, approximately 140,000 hectares of forest have been cut and reforested, from a productive landbase of close to 800,000 hectares. In the early years, much attention was paid to developing detailed inventory information, leading to the production of the first Detailed Forest Management plan in 1960. This plan has been updated and revised four times since (1966, 1977, 1986, 1991), to include improved information on forest inventory, growth and yield; better management planning tools including computer modelling; and to reflect changes in the landbase arising from such activities as facility expansion, coal mining, oil and gas exploration and wildlife reserves.

Certain objectives and strategies have remained common throughout all these management plans, and can be credited for much of the success and sustainability of this operation, now 40 years old. These are:

- sustained yield forest management
- provide overall cutting plan to schedule operations, maintaining uniform haul distance
- improve stand vigour, cut oldest timber first

As time developed other needs were identified and these also are included in the statements of intent:

- practice integrated resource management
- balance winter and summer cuts
- balance the flow of sawlogs and pulpwood to the Hinton processing plants.

The fifth revision of the Forest Management Plan is due in 1998. Need for a new forest estate model is being evaluated as a cooperative project between Weldwood, Foothills Model Forest, the University of New Brunswick and the Forestry Corps. The new model incorporates wildlife habitat supply information and models in the analysis to assess the impacts of forest management strategies on wildlife habitat supply and species response on a sustainable basis.

Because so many wildlife models rely not only on quantities of habitat but also on habitat arranged in a particular manner, many of them will be a GIS-based. A "blocking model" is nearing completion which will be used to generate patterns of disturbance (cut blocks, roads, etc.) within operating compartments. The new forest estate model will then be required to produce "snapshots" of future landscapes which can then be evaluated by the wildlife habitat models.

The new forest management plan will rest within, and to a large extent direct, a Linked Planning Process developed by Weldwood and the Alberta Forest Service in 1993. At the time of development, there was no process in place which could be used to examine the impacts of short term decisions, such as the scheduling and timing of forest

operations, on the long term assumptions which support the allowable annual cuts developed in the forest management plan. This process was designed to provide explicit linkages and feedback/ correction loops between forest management plans, general development plans and annual operating plans. A key feature of the process is an annual stewardship report which examines and reports on the impacts of operational activities on the forest management plan assumptions. Depending on the range of variation from these assumptions, corrective actions could be triggered. In the Company's view, this linkage is critical to assess progress towards the goal of sustainable development. The Linked Planning Process is now being built into the Forest Planning Manual for the Province.

## *FOREST INVENTORY SYSTEMS*

All inventory systems are being upgraded for the 1998 Forest Management Plan revision.

**Permanent Sample Plot (PSP) system**

3,000 - 1/5 acre (.08 ha) and 1/10 acre (.04 ha) plots were established from 1956-1961. This year, some will have been remeasured for the fifth time. PSP information is used to develop tables of volumes and log profiles and to model growth of stands and individual trees. Additional PSP's and temporary sample plots (TSP's) will be installed where required.

**Management Inventories**

Every management plan revision requires a new forest inventory. Until now, the management inventory for the forest management plan was gathered through the interpretation of photo point samples on a 0.8 km grid throughout the Agreement area. Forest stand information from these points was translated into volume using volume tables developed from PSP data. The management planning model had growth factors, also developed from PSP data, which "grew" the forest over time as the model "harvested" the stands in a planning sequence.

The Photo Point Sample Inventory has been abandoned and the 1998 forest management plan will have a new spatial inventory, using Alberta Vegetation Inventory (AVI) standards, developed from the interpretation of individual forest types throughout the Agreement Area. Individual stands will be mapped from the aerial photographic interpretation, and stand listings are then to be translated into volumes and log profiles. Since the forest is a dynamic system, many changes will occur before some of these fine type inventories will be used to plan operations. For this reason, growth factors are also included in models which will "grow" the forest stands in the operating compartments, to maintain current information.

## Fine Type Inventories

Operational harvesting, reforestation and habitat management plans require more site-specific information than PPS inventories provided, or than the new Management Inventory will provide. To meet these needs, a detailed forest inventory is conducted for upcoming operating compartments, using aerial photo interpretation and extensive ground truthing of the interpreted forest stands. Stand listings are translated into volumes, log profiles, and other operational information.

This inventory, also conducted to AVI standards, will be included with the management inventory to provide the inventory for the 1998 forest management plan revision. It differs from the Management Inventory only in that the level of detail collected is more precise.

## Ecological Site Classification

Detailed ecological site classification mapping is being done in conjunction with the fine type inventories. A hierarchical structure is used to identify uniform areas of soil moisture and nutrient status, elevation, slope, aspect and overstorey composition. These are being developed for upcoming operating compartments on the Agreement area. In addition, a computer-based system (ELDAR) is being considered to take soils, vegetation and topographical information into consideration to generate ecological site classifications for those operating compartments not yet scheduled for detailed inventory.

## Regenerated Stands Inventory (RSI)

This program examines the present status of regenerated stands, dating back to those established following logging in 1956. RSI data will be used to identify management needs and opportunities such as release from hardwood competition, or intensive management investments aimed at improving stand growth and yield. It will also form the standing inventory input for the managed stand yield table program, and therefore requires more detail than either the Management Inventory or the Fine Type Inventory can provide.

## Wildlife Habitat and Use Inventory

In recent years, we have started to collect wildlife habitat and use information in conjunction with our other inventory programs. This information will be used as part of our integrated resource management planning process, to provide preliminary indications of species distribution and abundance. These indications can then be used in the formulation of specific wildlife and habitat plans.

## *TWO PASS PATCH CLEARCUTTING AND EXTENSIVE FOREST MANAGEMENT*

### Harvesting

One of the objectives in the forest management plan is to harvest the older, slow growing and disease-susceptible timber as soon as possible to replace it with thrifty, fast-growing young trees. Working Circles, each a sustained yield management unit are subdivided into operating compartments based on predominant age classes and topographic features. These compartments are then prioritized for the progression of harvest entry.

Harvesting and reforestation began in 1956. Clearcutting is an appropriate silvicultural technique for the species on the Weldwood FMA. Continuous clearcuts are not allowed in Alberta, and alternate patch or block clearcutting is the common cutting method now used. This usually involves setting out a patchwork pattern of first-pass and second-pass blocks, considering topography, roads, drainage, wildlife, fisheries, aesthetic and economic concerns. Approximately half the blocks are harvested in each pass, with second-pass harvest commencing once first-pass blocks have been adequately regenerated with regeneration averaging two metres in height.

Volume is removed in two steps, with relatively small block sizes and long periods between the first and second cut. As can be seen along ridges and low elevations, a lot of volume is never harvested because it grows on land that is too steep, or the timber is too small, or it grows along streams where a buffer of standing timber must be left to protect the stream.

Extensive, rather than intensive forestry is practised in Weldwood's forest. The traditional, intensive forestry practised in parts of the world where the landbase is limited and every cubic metre of its productive capacity must be realized, is not generally an accepted practice in Alberta. The public expects a variety of benefits from the forest land, including wildlife production, watershed protection, biodiversity, availability for recreation and unlimited access.

In Weldwood's terms, extensive forest management means that all areas harvested are reforested and maintained in forest production, but the resulting new forest contains a mix of species, numerous openings, a variety of wildlife, and so on. Yet it is growing and producing more fibre per hectare than the original forest which it replaced.

Overstorey removal cuts are being tried on an experimental basis, where mature aspen trees are harvested while preserving well-stocked spruce understories. Partial cutting is used on a small scale on sensitive sites, where full or nearly full site occupancy is to be continued while still extracting fibre and initiating new regeneration.

## Reforestation

Under the terms of our FMA, we must progressively reforest all harvested areas. Because performance of regenerated stands influences the Allowable Annual Cut, we have an additional incentive to assure prompt regeneration. Since 1956, the Company as aggressively fulfilled this commitment.

Experience has shown that with prompt and adequate seedbed preparation, traditional cutblock configurations have resulted in satisfactory natural regeneration. Artificial regeneration practices (planting or seeding) are used where natural regeneration is improbable or has failed, or where vegetative competition risk is high.

The silviculture program maintains the long-term wood supply from the FMA area. Fire-origin stands harvested, or destroyed by natural causes, are replaced with stands of vigorous crop trees. These stands are protected and tended until the next harvest, at which time the cycle will be repeated.

White spruce, lodgepole pine and trembling aspen typically reproduce in nature following wildfire. White spruce also seeds in as an understorey in aspen stands. For this reason, most timber stands on the FMA area are even-aged, with few species (monocultures) and large, sometimes in the hundreds or thousands of hectares. Harvest and reforestation attempt to emulate this pattern, although with two pass harvesting and small cutblock sizes the new forest becomes much more fragmented than the fire origin forest.

## Stand Tending

Many successfully regenerated stands require treatment during their juvenile stages to control suppression and mortality. Aspen has been the most devastatingly competitive species on sites regenerated to conifers, both directly through inter-specific competition and indirectly through provision of hare habitat. In most Canadian provinces, this competition is controlled through the use of registered herbicides, and this tool is being carefully introduced for Alberta.

On some sites, particularly those regenerated to pine following logging or wildfire, intra-specific competition has impeded stand development. Various tactics have been tried for competition control, with manual brush saw treatment being the most prevalent. Regenerated stands may be commercially thinned in future.

## Enhanced Forest Management Program

Fibre from both FMA and non-FMA sources is the raw material for the Weldwood, Hinton Division Pulpmill and Hi-Atha Sawmill. In Alberta there is currently a surplus of purchase fibre, mainly byproduct chips, available from non-FMA areas. Despite this surplus, the price is significantly more costly than fibre obtained from FMA lands. A

study by KPMG Management Consulting has indicated that the construction of additional manufacturing capacity in Alberta is expected to eliminate this surplus by the year 2000. This will place further upward pressure on the cost of purchase fibre. In response to this threat, Weldwood of Canada, Hinton Division initiated the Enhanced Forest Management program to increase the contribution of the Forest Management Area to the Division's fiber supply so that the Division's per unit fiber costs are minimized.

Past studies have demonstrated that there are realistic opportunities to improve stand yields on the Forest Management Area through silviculture investment. Potential improvements to final stand yield ranging from 2 to 100 percent depending on species being managed and the silviculture treatment employed have been documented. Although these estimates do not represent a one to one increase in the allowable cut of the Forest Management Area, they do give an indication of the potential opportunity to improve the contribution of the Forest Management Area to Division's fiber needs.

Implementation of the Enhanced Forest Management program began in 1996 with the goal to increase the sustainable annual allowable cut of the Forest Management Area from 1.9 to 2.2 million cubic meters by the year 2008. Intensive management strategies that are specific to this objective and the age class structure are being developed. The determination of which combination of intensive silviculture treatments that will effectively and efficiently achieve this is a complex problem requiring the use of rigorous forest level analysis. This assessment requires four steps:

a) Silviculture strategies that increase both the short and long term AAC will be assessed,

b) Strategies that conserve growing stock by either accelerating the growth of regenerated stands, or capturing mortality in stands experiencing losses will be identified,

c) The forest-level implications of alternatives will be analyzed and those treatments which produce the desired increase to the AAC will be selected,

d) A detailed implementation plan will be developed which will enable performance monitoring in support of the AAC.

Upon initial review, the costs and benefits of certain strategies, such as tree improvement, pre-harvest planning, prompt reforestation, achieving full stocking, backlog reforestation and early brushing and weeding, were relatively well known and were implemented almost immediately. Other treatments such as juvenile spacing, commercial thinning, and fertilization required further study and trials began in 1997 to further evaluate these treatments. A formal screening process along with public involvement is being used to evaluate the technical, environmental and economic considerations prior to operational implementation of these programs.

## SILVICULTURE SUMMARY

| | (ha) |
|---|---|
| Total Area Cut to Dec. 31, 1996 (est) | 148,553 |
| Cutover Treatment | |
| -Site preparation for natural seeding | 90,695 |
| -Aerial seeding | 5,365 |
| -Planting | 68,277 |
| -Manual spacing of over-dense regeneration | 1,800 |
| -Release of regeneration from competing vegetation | 6,867 |
| Reforestation Success (to most recent survey) | |
| -Area Surveyed | 113,580 |
| -Area adequately reforested (96.4%) | 110,331 |
| -Area requiring further treatment or resurvey (3.6%)* | 3,249 |
| -Area with serious vegetative competition problems (est) | 22,000 |
| Hinton Reforestation Centre | |
| The nursery grows 800,000 seedlings per sowing. 1,600,000 seedlings will be grown in 1997. | |
| 1997 Reforestation Plan | |
| -Planting 5,416,000 trees | 3,385 |
| -Site Preparation for Planting | 4,818 |
| -Scarification for Natural Regeneration | 3,212 |
| -Stand Cleaning (manual release from hardwood competition) | 2,600 |

Note *: Areas requiring further treatment are continuously addressed by resurvey, fill-in planting, etc.

## *FOREST OPERATIONS*

### Harvest Systems

When the Company began woods operations in 1956, men cut trees with powersaws and used horses to skid them to roads, where they were cut to 100 inch lengths and piled. Using draglines, wood was loaded onto pulp trucks and hauled to Hinton over a network of winter roads. A good day's production for a man was about 8 $m^3$. To produce the 843,000 $m^3$ required for the pulpmill, 450 woodsmen plus support staff were required. Ten large, permanent camps housed the woods crews. One of these was only 24 km from town.

In 1965, the Company began experimenting with tree length harvesting using wheeled skidders to move the wood to roadside where it was mechanically slashed before hauling. In four short years the conversion was complete. The bush camps and horses were gone, replaced by crews that commuted each day between the woods and town. As the quality of roads improved, hauling became a year-round activity.

The next major step in the evolution of logging systems came with the purchase of two feller-bunchers in 1973. Today, about 90% of wood production is from fully mechanized logging systems. For many years, combinations of feller-bunchers, line or grapple skidders, delimbing at roadside with single stem delimbers, and wood hauling with self-loading trucks have been the major systems.

Hand falling, with an average man day productivity of 35 $m^3$, is now restricted to areas where terrain or tree size prohibit the use of mechanized systems. As new technologies emerge, the role of hand falling continues to decline. It cannot match the productivity (and safety) of fully mechanized systems where production approaches 120 $m^3$ per man day. Such productivity will be tested to the limit as the level of harvest has risen from 600,000 $m^3$ in 1989 to around 1,900,000 $m^3$ (plus 126,900 $m^3$ of aspen) in 1997.

**HARVESTING SYSTEMS DEPLOYMENT 1997**

| System | Type | % of Volume (approx) |
|---|---|---|
| Feller Buncher, Grapple Skidder,Roadside Delimbing | Tree Length | 10 |
| Feller Buncher, Grapple Skidder, In-block Delimbing | Tree Length | 45 |
| Hand Falling, Topping, Line Skidding, Roadside Delimbing | Tree Length | 4 |
| Feller Processor, Grapple Skidder | Tree Length | 22 |
| Feller Processor, Clambunk Forwarder ( can also do shortwood) | Tree Length | 6 |
| Feller Processor, Shortwood Forwarder | Shortwood | 4 |
| Feller Buncher, In Block Topping, Grapple Skidder, Bush Chipping | Chips | 9 |

*80% of all skidders and forwarders are equipped with flotation (wide) tires*

## Harvest Planning Systems

Over the past 40 years, harvest planning has evolved from a system which was entirely timber-driven to today's system of plans that consider and incorporate a wide range of multiple use values in harvest designs. Although timber production is still the prime use of most of the FMA area, planners also consider and balance other resources such as watershed protection, aesthetics, recreation, wildlife and fish habitat, and archaeology.

The size of cutblocks has generally been dependent on the type of harvest system used. When horses were used, blocks tended to be small because horses could only skid about 50 metres. When large cable skidders were added, skid distances of 500 to 800 metres were within reason, and block sizes could be large, often over 80 hectares. In recent years, block sizes have been decreasing because grapple skidders have a maximum skid distance of 200 metres, and because of other considerations such as wildlife habitat. Some parts of the FMA area have been identified as having key value for resources other

than timber. In those areas, modifications to conventional harvesting systems are being evaluated and implemented. These include techniques like smaller patch cuts, longer intervals between harvest passes, and some testing of shelterwood cuts (an even aged form of selective harvest).

Improved systems for operational planning, inventory maintenance, record-keeping, and integrated management are under development by staff and by contractors. New inventory systems, such as the Regenerated Stands Inventory, will be integrated with existing systems. New stand-level growth projection models are being obtained. Use of a Geographic Information System (GIS) is fundamental to all systems under development. All maps, formerly hand drafted, are now produced using the GIS. More importantly, the system supports all the data which is tied to the map features. By merely changing the boundaries of features on the map, the planner is then able to receive information from the system about the impact of those changes on such values as timber volumes, log profiles, summer/winter wood splits, wildlife habitat, etc.

**Road Development**

Two objectives of the Forest Management Plan have had a major influence on the progress of harvesting operations and the development of roads throughout the FMA area. In general terms, the Company tries to harvest the oldest timber first, and balance the haul distance to the mill. The results are a network of roads and a pattern of harvesting that spreads throughout the original FMA area. Because of these objectives, large areas of uncut timber still exist within a few kilometres of the mill, and the average haul distance over the period of the first rotation remains around 68 kilometres.

The new facilities demand a large supply of wood which cannot be satisfied entirely from outside sources and wood from the original FMA area. In 1988, a new FMA was signed, giving the Company the rights to the timber resources on an additional 2300 square kilometres, largely without roads. Gearing up to satisfy the new mill requirements included a major expansion of the main trunk road network. Over 160 kilometres of new trunk road are required to serve this expanded area.

## *SUSTAINABLE ECONOMIC CONTRIBUTION*

Weldwood of Canada has made a steady contribution to the economy of Canada, Alberta and Hinton over the past 40 years. In addition, the Company makes a substantial effort to be a good corporate citizen of the Town of Hinton. Some statistics for the Hinton area are presented to illustrate this contribution.

### 1996 Economic Activity
### Hinton and Surrounding Area

| ITEM | DETAIL | VALUE / QUANTITY |
|---|---|---|
| Employee Base | Pulpmill | 650 |
| | Hi-Atha | 225 |
| | Forest Resource | 135 |
| | Logging Contractors | 410 |
| Payroll | Pulpmill | $ 36,000,000 |
| | Hi-Atha | $ 12,000,000 |
| | Forest Resources | $ 10,600,000 |
| Local Expenditures<br>- vendors<br>- contract services<br>- donations<br>- contractors | Pulpmill<br><br>Hi-Atha<br><br>Forest Resources | $ 40,000,000<br><br>$ 3,000,000<br><br>$ 27,000,000 |
| Taxes | Town of Hinton | $4,340,000 |
| Water Supply :<br>Town of Hinton | Weldwood treats and supplies all the potable water for the Town | 2 – 2.5 Million Gallons/ day |
| Sewage Treatment :<br>Town of Hinton | Weldwood treats all of the Town sewage | Approx. 1.5 Million Gallons/ day |

## *MAKING THE MOST OF OUR FOREST RESOURCE*

Weldwood has formed strategic partnerships with other forest products manufacturers in West Central Alberta to make sure:

- we get the most value out of the resource
- no part of the resource is unused
- all operations have enough fibre to operate