FOOTHILLS MODEL FOREST

Annual Report

MODEL FOREST NETWORK
RÉSEAU DE FORÊTS MODÈLES

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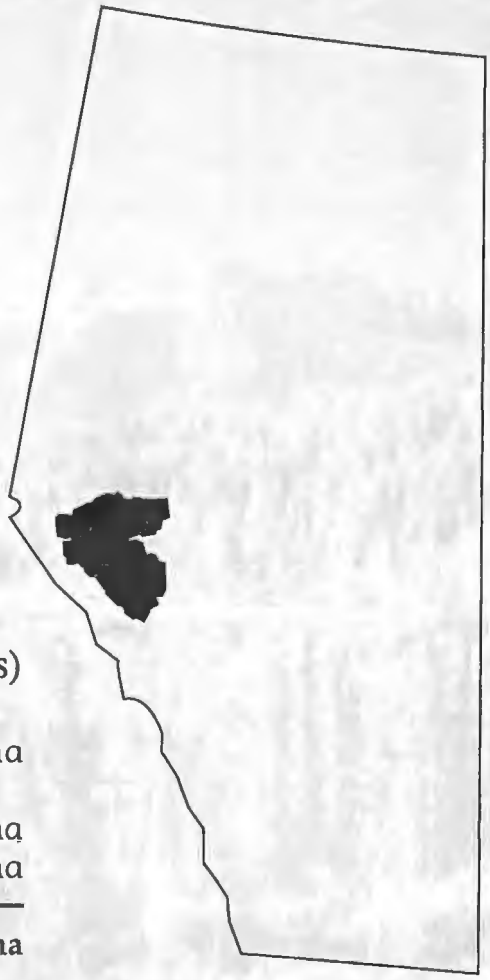

Foothills Model Forest

(boreal, subalpine, and montane forest regions)

Weldwood of Canada Limited Forest Management Agreement Area	1,012,119 ha
Crown Forest Management Units	202,962 ha
Cache Percotte School Forest	2,933 ha
Total Land Base	**1,218,014 ha**

Contents

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Honourable Anne McLellan
Minister of Natural Resources
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Ottawa, Ontario
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May it please your Honour:

On behalf of the shareholders and partners of the Foothills Model Forest, I respectfully submit the Annual Report for the fiscal year ended March 31, 1995.

Robert W. Udell, R.P.F.
President
Foothills Model Forest

MODEL FOREST NETWORK
RÉSEAU DE FORÊTS MODÈLES

President's Message

The Foothills Model Forest has now completed its second full year of operation and continues to make progress in the many areas of research being carried out in this, Alberta's Model Forest.

Our program experienced considerable growth in the past year with the addition of funds from Alberta's Wildlife Enhancement Trust Fund. A number of new wildlife related projects were implemented in the latter half of 1994 and will begin their first full field season in the coming year. This additional funding has brought with it a host of graduate students from various universities across Canada. We welcome them and the tremendous contribution that they will make to our program.

Watershed and socio-economic research projects, both important elements of our overall program, have also been developed and are currently being implemented with the help of a number of our partners and sponsors. The complexity of each of these subject areas warranted a "go-slow" approach but we now feel that work being carried out will provide an excellent foundation for both future research and management practices.

The Foothills Model Forest continues to recognize the vital role that partner cooperation and involvement play in the success of the Model Forest Program. The dedication and enthusiasm that comes from our partners is one of the great strengths of our Model Forest and the Network as a whole. In recognition of this importance, the Foothills Model Forest hired a partner liaison officer in 1994 to ensure that partnerships continue to be productive and effective for the remainder of our tenure as one of Canada's ten Model Forests.

Involvement with our international Model Forest partner in Chihuahua, Mexico continues to grow and develop. Their program has gone from a proposal document stage to implementation in a very short period of time and is a tribute to both hard work and the strength of partnerships. We hope that this positive association continues well into the future.

1995 brings with it a host of challenges. Our program will move into the second half of its term and results will begin to come from the many activities that we have embarked on. We will now begin to move this information into the main stream to ensure that Canada is truly a leader in sustainable forest management. We look forward to that challenge.

Sincerely,

Robert W. Udell, R.P.F.

President

Program Overview

The Foothills Model Forest is one of 10 Model Forests that make up Canada's Model Forest Network. The network is funded as part of the "Partners in Sustainable Development of Forests" program, administered by the Canadian Forest Service of Natural Resources Canada.

The Partners in Sustainable Development of Forests program was developed to demonstrate Canada's commitment to sustainable development and to maintain the health of our forests for the benefit of people everywhere.

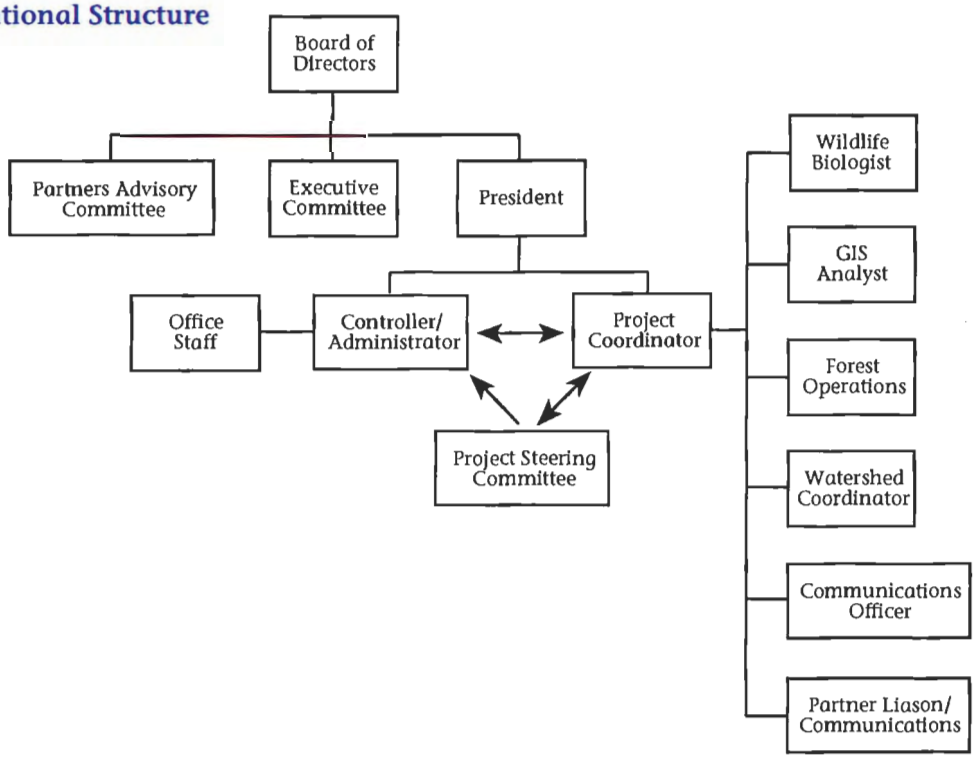
The Foothills Model Forest's mission is: "to develop and recommend an approach to sustainability and integrated resource management through research and technology developed by means of collaborative partnerships."
The sponsoring partners are commited to achieving this mission by incorporating values such as conservation, cooperation and integrated resource management into the Foothills Model Forest program.

The Foothills Model Forest is a non-profit corporation, founded on November 2, 1992 under Part 9 of the Companies Act of Alberta. The Board of Directors has overall responsibility for the Foothills Model Forest program and is comprised of 10 members including representatives from the sponsoring partners, Jasper National Park and the Partners Advisory Committee.

An Executive Committee, comprised of local representatives from the Board of Directors who represent the sponsoring partners, meet regularly to expedite the delivery of the Annual Work Plan.

The Partners Advisory Committee is a 12 member group made up entirely of elected representatives from the larger partner coalition. This group, working in conjunction with the Project Steering

Foothills Model Forest Organizational Structure



Committee, is responsible for helping to identify any potential information gaps that may exist in the development of work plans and making recommendations to the Board of Directors on proposed plans and activities.

The Project Coordinator, a full-time forester seconded from the Department of Environmental Protection, and the Administrator, in conjunction with the Project Steering Committee, are responsible for the overall coordination and continuity of the Foothills Model Forest program. The Project Steering Committee, with representation from Weldwood of Canada Limited, the Environmental Training Centre, Alberta's Land and Forest Services and Fish and Wildlife Division, and Jasper National Park prepare the annual work plans, five year work plans and submissions for the annual report.

The projects and activities of the Foothills Model Forest are delivered by full-time staff including a GIS (Geographic Information Systems) analyst, wildlife biologist and technician, forest operations coordinator, watershed coordinator, communications officer and a half-time partner liason/ communications officer. Research opportunities have also been created for 16 graduate students as well as a number of research assistants from the University of Alberta, University of Calgary, and the University of Guelph.

Jasper National Park has also devoted one full-time position to the Foothills Model Forest to coordinate joint projects.

Foothills Model Forest Officers and Board of Directors

Chairman of the Board
Dennis Quintilio
Director
Environmental Training Centre

President
Robert Udell
Forest Planning Manager
Weldwood of Canada Limited (Hinton Division)

Secretary
Marsha Spearin, Administrative Coordinator
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University of Alberta

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Fish and Wildlife Division

Colin Edey (elected member)
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Nova Corporation

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Dennis Hawksworth
General Manager, Forest Resources and Lumber
Weldwood of Canada Limited (Hinton Division)

Cliff Henderson
Director, Forest Management Division
Land and Forest Services

Don Laishley
Director, Forest Strategy
Weldwood of Canada Limited

Ex-officio Member
Bob Newstead
Model Forest Coordinator
Canadian Forest Service
Northwest Region

Activity Areas

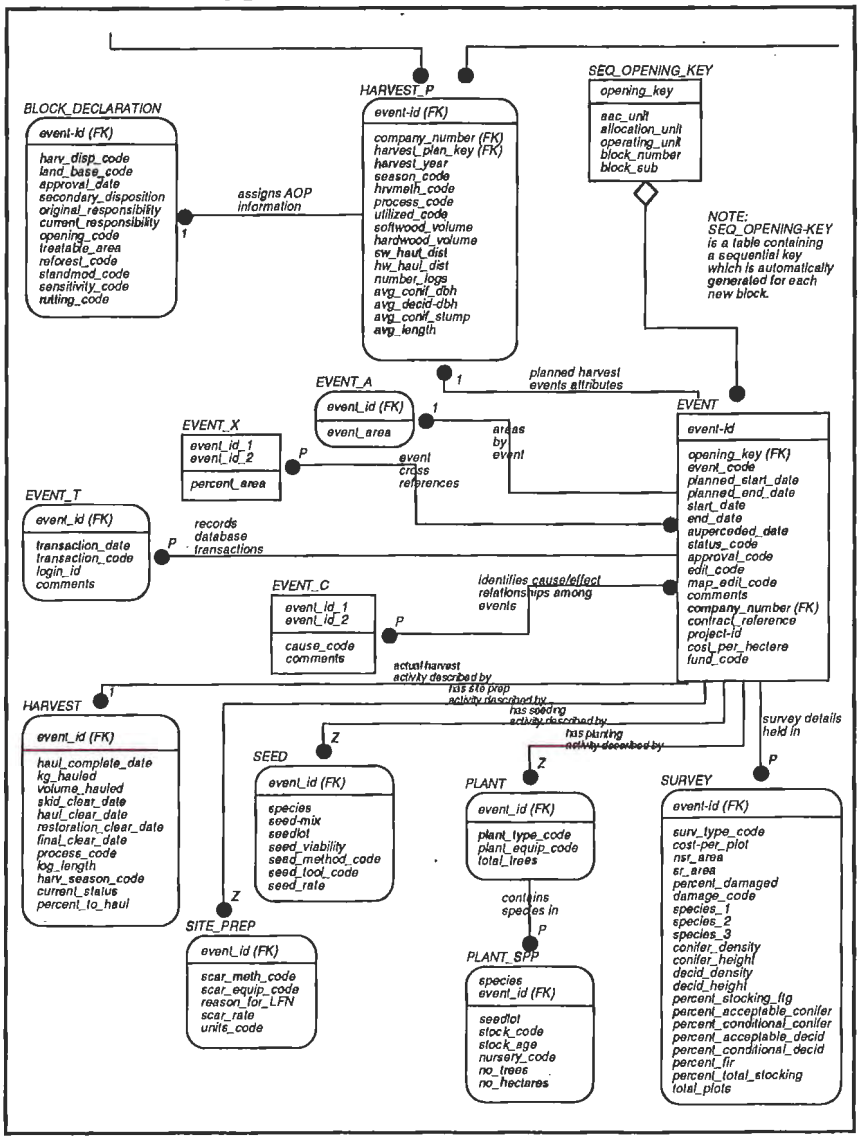
Information, Research and Knowledge

1994 saw continued development of the Foothills Model Forest Ecologically-Based Decision Support System (DSS), a conceptual framework that organizes the components of an integrated resource management decision process into a flexible, transparent, intuitive and modular structure to support decision makers through the management, analysis and resolution of integrated resource management decisions. Four key components make up the DSS; forecasting, interpretation, management strategy definition and feedback. Forecasting defines and characterizes the resource over time as it develops naturally and with management interventions. Interpretation places values upon the quality, and quantity of a resource. Management strategy definition identifies geographically explicit interventions. Feedback provides the link between strategies and consequences, an opportunity to understand the interrelationships between resources and offers insight into developing new management strategies. The Foothills Model Forest DSS embodies these four components in four segments: Ecological Foundation, Landscape Forecasting, Assessment Models and Socio-economic Analysis.

Ongoing projects leading towards the development of the Decision Support System include the following.

Data Model Development

The foundation of any computer-based decision support tool must include a well designed data model upon which all applications are built. The data model must also integrate and allow access to all types of data to be used within the system and must document the relationships among those data. The detailed design specifications for this data model provides both users and application developers with a type of dictionary and road map



Excerpt from Foothills Model Forest Data Model

describing what the data look like and how to access same.

Development of the Foothills Model Forest data model continued in 1994 with additional modifications to the existing detailed model and further testing of the ArcForest™ software.

A new version of ArcForest™ (version 1.3) was evaluated in the fall of 1994 and at that time it was decided that the product no longer met our needs in terms of ease-of-use and flexibility. Instead, the Foothills Model Forest GIS will be based on commercially available "off the shelf" products which can provide us with more flexibility and more timely incorporation of new products and product enhancements.

A physical test of the data model design was completed in early 1995 and data were assembled and loaded for two mapsheets with modifications made to the model as necessary. Final documentation is expected by the end of the 1995 calendar year.

GIS Technology Transfer

A 10 station GIS training lab, located at the Environmental Training Centre (formerly the Forest Technology School), was established by the Foothills Model Forest in early 1993. A joint venture was initiated with the University of Alberta in 1994/95 to have the University administer GIS training courses through the Faculty of Extension using contract instructors. Three test courses were held in early 1995 and were quite successful. Additional courses will likely be run through the University in the coming fiscal year.

NAIA Development

The NAIA forestry program is concerned with the design and implementation of an ecologically-oriented spatial and knowledge-based framework to support forest and land resource management. As part of this program a decision support system was designed and implemented with the capability of representing the knowledge used by a forest ecologist to infer forest ecosystems.

NAIA was designed as a generic expert system that uses a taxonomic ecological classification. This expert system implements a combination of two different reasoning processes and predicts the ecosystems from the physical and vegetative data contained in the GIS.

Additional programming over the past year has enhanced the link between various GIS databases (digital elevation model, forest cover information and forest soils) and the Oracle™ database management software.

Revisions to the "Field Guide to Forest Ecosystems of West - Central Alberta" have also been coded into the NAIA expert system. Additional field validation of test runs has helped to improve the predictive accuracy of the software, particularly for the Upper Foothills Natural Subregion.

Tremendous progress has also been made in translating the NAIA software from its native ArcInfo™ format to GRASS, a freeware GIS package. This was done by the Alberta Research Council in an effort to facilitate more rapid development and enhancement of NAIA's functions outside the scope of the original project. These enhancements will be translated back into ArcInfo™ at a later date.

Development of a Blocking/Landscape Forecasting Model

By providing "snapshots" of the seral stage of each geographic unit in the forest landscape at points in the future, assessment models can be used to evaluate the ability of that landscape (and thus the management strategies that resulted in that landscape) to provide for other resource values. Wildlife assessment models in particular will require knowledge of spatial location in determining habitat quality. Two capabilities are required in order to develop accurate inventory snapshots. First, a blocking model is needed to delineate the geographic units to which the management strategies are applied. Second, a landscape forecasting model is needed to apply management strategies (and natural events) to geographic units through the planning time horizon.

Significant progress was made on the development of the blocking model, a GIS-based model that simulates the harvest of the forest, in 1994/95. Many of the functional elements of the model are now in place and work is continuing on the user-interface to make it more accessible to non-programmers.

A problem analysis for the landscape forecasting component of this program was initiated just before the end of the fiscal year. This report, which is scheduled for completion in July of 1995, will help to guide the final development of this product.

The Effects of Forestry Practices on Lichen Communities in the Foothills of West-Central Alberta

Past studies in Alaska, Canada (NWT, B.C., Alta., Ont., Nfld.), and Finland have shown a close relationship between caribou populations and lichen abundance within forests of specific ecoregions and stages of development.

arboreal lichens

The effects of commercial forestry practices on terrestrial lichens through both direct and indirect influences have the potential for producing a wide range of impacts on the terrestrial lichen component of forest communities.

For that reason, the Foothills Model Forest has embarked on a study to obtain specific data (vegetative structure, composition, and diversity) from lodgepole pine stands and their associated lichen communities which possess the characteristics of potential caribou habitat and to document the effects of different forestry practices on those communities.

All sample site establishment and pre-harvest data collection was completed in 1994 in similar lodgepole pine-lichen ecosystems. Methodology for both the summer and winter harvest components was also finalized and the areas identified for harvest were cut by Weldwood of Canada Limited. Various combinations of harvest treatments were used including

scarification, no scarification, on-site processing, and road-side processing in both summer and winter replicates. Control areas with no harvest activity have also been set up for each treatment type.

Post-harvest data collection and analysis is slated for the summer of 1995.

Effects of Forest Management on the Genetic Diversity of Lodgepole Pine and White Spruce

Widespread forest management has the potential to cause reductions in genetic diversity of forest trees, thereby impairing their potential to adapt to future environmental conditions. While concern is often expressed, there are few data available with which to address whether current management practices are having any influence on patterns of genetic variation in populations. This project will utilize DNA-based molecular techniques to quantify genetic variation in natural and managed populations of lodgepole pine and white spruce to provide insight into the effects of present-day forest management on genetic diversity in future stands of these species and, perhaps, lead to recommendations for modified procedures in order to ensure maintenance of genetic variation.

All field collections of harvested and unharvested stands were made in the summer of 1994. The DNA extraction protocol has now been fully developed. This step involved the development of a protocol that uses a much smaller amount of foliar material than past testing methods to facilitate the testing of hundreds of samples. A number of Randomly Amplified Polymorphic DNA (RAPD) markers were also tested and several have been found to be suitable for use with lodgepole pine. Methodology papers are currently being developed for these aspects of the study and will be submitted to a refereed scientific journal.

Screening of field samples began in January of 1995 with more detailed analysis of nursery seed and seedlings in the summer of 1995.

Additional funding from the Alberta Forest Development Research Trust Fund was also obtained for work in this subject area.

Integrated Resource Management and Sustainability

"The Foothills Model Forest was awarded a place in Canada's Model Forest Network on the basis of the region's strong history in forest and integrated resource management. The Green Plan has provided an opportunity to accelerate and expand a number of in-place initiatives in forest operations, integrated resource management, decision support systems, research, technology transfer, and public involvement".

Foothills Forest Business Plan, 1994

This commitment continues today and can be seen in the many varied activities that are taking place in the Foothills Model Forest.

Ecologically-Based Pre-harvest Planning

Planning for successful reforestation requires the integration of both silviculture and harvest planning. This is often difficult because a large number of variables have to be considered to produce a plan that is biologically sound, environmentally acceptable and economically reasonable. Without a systematic approach, essential elements

may be neglected or overlooked altogether. An ecologically-based pre-harvest planning process will provide a systematic framework to link silviculture and harvest planning to ensure timber and non-timber management objectives for the area are translated into site-specific operations.

The Foothills Model Forest and Weldwood of Canada Limited have collaborated on this project and after evaluating existing information about the ecosystems of west-central Alberta and reviewing data for the northern and eastern portions of the study area, a tentative classification framework was developed for west-central Alberta. A site classification working group, comprised of federal and provincial government, industry, and consulting firms, tested the tentative system in the field to increase its functionality for application to integrated resource management problems. Field surveys were conducted to fill in data gaps and have now been completed with over 2000 plots sampled.

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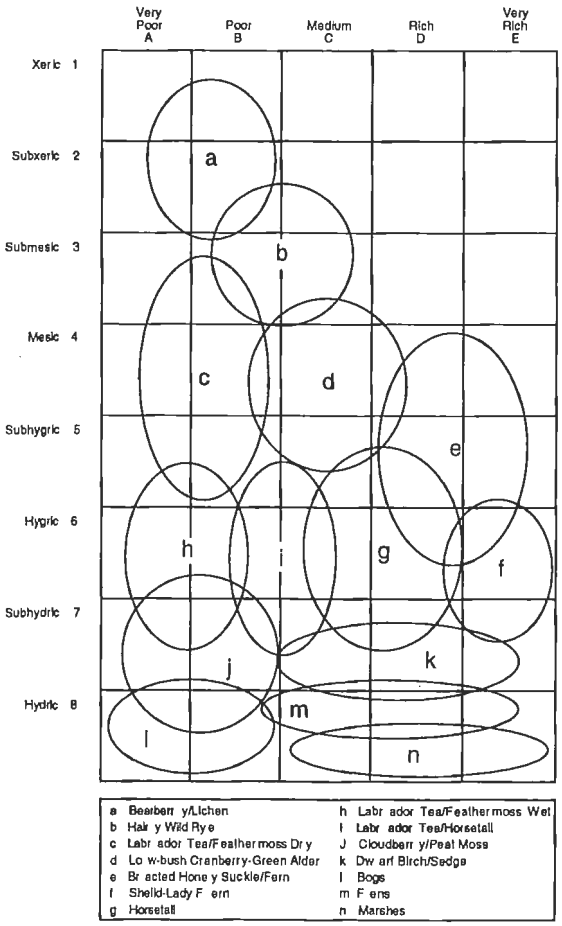


Geographic Dynamics Corp., 1995

Data analysis and compilation are complete and the revised field guide will be ready for review prior to publishing by the spring of 1996.

The Forest Wildlife and Ecology Program

The Forest Wildlife and Ecology Program applies the Mission of the Foothills Model Forest to wildlife and other ecological values of the forest ecosystem. Consultation with our major partners, including the Government of Alberta and Weldwood, has resulted in a three-pronged approach that includes research, modelling, and technology development.

1. Research

Northern Goshawk, Barred Owl/, Pileated Woodpecker, Red Squirrel, Elk, Songbirds, Woodpeckers, Mammals, Caribou, Lichen Communities, Forest Succession, Ecosystem Disturbance

The research component of the program focuses on the effects of selected land uses on ecosystem properties such as composition, structure, and function. Of the many land uses in the region, forest harvesting and silviculture were selected for research because of their obvious impacts on ecosystems. Of the countless ecosystem properties, wildlife species and their habitats were selected because of concern that harvesting and silviculture may be detrimental to some species. Because a focus on individual species is insufficient, research has also begun to address ecosystem processes such as disturbance, and its relationship to

important stand structures such as coarse woody debris and standing dead trees.

Nine research projects are studying the habitat requirements of either a single vertebrate species (Northern Goshawk, Barred Owl, Pileated Woodpecker, Red Squirrel, Elk), or multiple species (Songbirds, Woodpeckers, Mammals). Besides providing increased knowledge of habitat requirements, these projects will support the development and testing of habitat suitability index models (described under 2. Modelling). An additional four research projects are studying the effects of timber harvesting on Caribou, Lichen Communities, Forest Succession, and Stand Structure.

2. Modelling

Habitat Suitability Index models, Habitat Yield Curves

The aim of the modelling component of the program is to develop planning tools that allow forest managers to predict the probable effects of forest harvesting and vegetation succession on the habitats of selected wildlife species. A total of 30 single-species Habitat Suitability Index (HSI) models, which rank a specified forest stand according to its relative habitat quality, are being developed. Each HSI model considers between 2 and 15 stand attributes in the calculation of relative habitat quality. Some models also include spatial components that incorporate the needs of some species, such as elk, for particular spatial arrangements of stands.

HSI models are linked to existing timber supply models through a set of Habitat Yield Curves that predict the values of wildlife habitat attributes for many different forest cover types. Yield curves were developed for the 26 habitat attributes used in one or more HSI models, from a variety of existing data sources, including permanent sample plots, fuel sampling data, and regenerating stand inventories.

3. Technology Development

Habitat Supply Analysis

HSI models and Habitat Yield Curves are to be incorporated into a Habitat Supply Analysis (HSA) for use in the Foothills Model Forest Decision Support System. The Habitat Supply Analysis is a computer-based system that estimates habitat supply for selected wildlife species at specified time intervals over a 200 year planning horizon. This system will give planners the opportunity to review the effects of a proposed management plan on habitat supply for selected wildlife species.

Habitat Yield Curves / Habitat Inventory and Modelling

During the 1994/1995 fiscal year the initial set of Habitat Yield Curves which were developed based on literature reviews and opinions (during 1993/1994) were revised to more accurately reflect the biological nature of the forest types which they represented. This information was then written up as a draft report entitled "The Development of Initial Yield Curves for Habitat Analysis."

A database of forest and vegetation inventory data for the determination of empirical yield curves was also created using data acquired from Weldwood of Canada (Permanent Sample Plot Data, Regenerated Stand Inventory, and Ecological Plot Data which they had compiled from various sources) and from Alberta Department of Environmental Protection (Forest Fuel Inventory Data).

Calculations were performed on these datasets which produced summary habitat structure data for each plot and these summary data were then used to develop yield curves for incorporation into the Habitat Supply Analysis.

Presentations were made at the April 1994 Foothills Model Forest Open House in Hinton, Alberta (Poster), at the "Our Northern Forests" Symposium Nov. 6-9, 1994, Winnipeg, Manitoba, and at the Alberta Chapter of the Wildlife Society, March 24-25, 1995, Hinton, Alberta. A final report is in progress.

Woodland Caribou Winter Range Habitat Selection In West-Central Alberta

Across Canada, wildlife and forest managers have faced conflict with trying to integrate caribou habitat needs with timber harvesting activities. Recent work in Newfoundland demonstrated that clear-cutting mature forests on summer range may affect the movements and distribution of woodland caribou. When planning timber harvest in caribou range their spatial needs (to avoid predators) as well as maintenance of their prime food source, lichens, must be considered. Logging scenarios that meet a caribou population's spatial and forage needs are not yet clear eg. large blocks of cut-and-reserve or smaller cut-and-leave in 3 or more passes. In west-central Alberta costly timber harvest plans for caribou range have been negotiated but they are experimental in nature and need to be monitored.

In west-central Alberta, caribou distribution and habitat selection prior to timber harvest have been studied for 8 years. The northern half of the range has now been harvested. This past winter the Foothills Model Forest implemented a standard radio-telemetry helicopter relocation study to monitor caribou response to timber harvest using 26 radio-collared animals. The present study, in conjunction with the aerial relocation study and proposed studies examining non-habitat effects of timber harvest (such as changes in predator-prey relationships) will be used to develop habitat suitability indices for woodland caribou winter range in west-central Alberta.

The study area is outside the Foothills Model Forest in the Redrock/ Chicken/ Prairie Creeks area within Weyerhaeuser Canada Ltd.'s forest management area with assistance provided by Weyerhaeuser, Nova Corp., Alberta Fish and Wildlife, Alberta Land and Forest Services, International Colin Energy, the Recreation, Parks and Wildlife Foundation, and the Canadian Circumpolar Institute.

1994/95 winter data collection has been completed with 37 caribou track paths (marked with 340 GPS locations) followed. In the winter of 1993/94, 36 caribou track paths were followed and marked with 392 GPS locations.

Caribou relocation opportunities in the undisturbed portion of the study area during the past winter were less accessible by snowmobile as compared to the previous winter. Many of the relocations were too far west (in mountainous terrain) to be reached. Possible causes include: 1) logging was ongoing immediately south of the southeast portion of the study area which may have forced a shift in winter range to the west; and; 2) caribou response to increased wolf numbers in the study area. Significantly higher amounts of wolf

sign throughout the study area were found this past winter as compared to the first winter of our study. This may be attributed to snow depth. In the winter of 1993/94 maximum snow depth observed in the study area exceeded 100 cm while in 1994/95 the maximum snow depth was 83 cm.

Data analysis is now underway with a draft report expected by December of 1995.

Pileated Woodpecker Study

The pileated woodpecker has been selected as a management indicator species for some forests in the United States as part of the National Forest Management Act. This directs the U.S. Forest Service to manage National Forests for pileated woodpecker habitat sufficient to ensure the continued existence of the species. In Canada, the pileated woodpecker has been selected as a management species for the Weldwood Forest Management Area in Alberta, and in Saskatchewan, Manitoba, Ontario, Quebec, and New Brunswick. In the Weldwood Forest Management Agreement area, habitat supply forecasts assume that habitat supporting pileated woodpeckers will also support a number of other forest wildlife species and communities. The United States Fish and Wildlife Service developed a preliminary Habitat Suitability Index (HSI) model for the pileated woodpecker, designed to evaluate the year-around habitat of the pileated woodpecker. Published information on the pileated woodpecker comes mostly from the United States, primarily in the Pacific Northwest. General distribution and nest records are the only available information on pileated woodpeckers in Canada. Because available information was collected in very different ecological conditions, it is not applicable to the Foothills Model Forest, and our DSS must be calibrated with local information. Additionally, little is known about winter habitat ecology and the impact of forest harvesting, particularly the effects of habitat fragmentation.

To date, a total of 63 nests have been located either directly by field study or through a large volunteer network with 40 of the nests measured to date. An additional 45 roost trees have also been identified with approximately half of these being measured.

Eighteen adults have been captured and fitted with radio transmitters in the first two years of the study. This sample has resulted in 1800 locations that will be used in a home range analysis.

Indirect habitat use information from more than 2000 woodpecker excavation sites has been obtained and is being transferred to a computer data base for analysis. This survey data will be compared to that collected from the telemetry program to see if any relationship exists.

The final season of telemetry collection and nest tree measurement will take place in 1995.

Winter Habitat Selection by Elk in a Boreal Mixedwood Ecosystem

The Elk has been selected as a priority species for HSI model development and testing for several reasons, one of which is the nature of the habitat model itself. The model for elk is highly spatial and complex, currently composed of 12 variables representing both forage and cover needs; this necessitates a GIS version for analysis in time and space. Testing of a model of this complexity lays the foundation for simpler spatial analyses for

other species.

A trapping and collaring program for elk was completed in the summer of 1994 and now includes a total of 12 animals.

A total of 179 telemetry relocations were obtained by the end of August, 1994. Error determination has been completed on the bulk of these locations for use in habitat selection studies in the future.

An additional 239 winter-confirmed locations were obtained in the winter months to help in the determination of winter habitat selection. Data analysis will commence in the summer of 1995.

Long-toed Salamander Study

The Long-toed Salamander is a subterranean salamander found throughout western North America. In Alberta this salamander has been red-listed by Alberta Forestry, Lands and Wildlife (1991) meaning that populations may be "in serious trouble" and it is thought that the populations in Alberta may be particularly vulnerable to habitat destruction or alterations associated with industrial, recreational, or transportation development.

Long-toed salamander

The distribution of these salamanders in Alberta is not well documented. Hinton may represent the farthest east these salamanders occur but intensive pond searches have not been undertaken to determine the actual eastern limits in this area. This information is important to detect whether the range is expanding or decreasing over time. There are also some inconsistencies in the literature as to what subspecies occurs in the Hinton area with the Hinton populations designated as the Eastern subspecies. Others however think that the populations in the Hinton area are more similar in appearance to the subspecies found in central British Columbia.

This study is designed to determine the critical habitat requirements of the Long-toed Salamander in the Foothills Model Forest and will be used to develop a HSI model for this species. Also, this study will provide a clearer picture of their movement patterns and the distribution and size of populations at breeding ponds will be determined. Genetic analysis will also be conducted on salamanders from the Hinton area and other populations in different areas of its range to determine the relationships between the populations.

During the summer of 1994, 6 pitfall arrays (3 within 250 metres and 3 within 500 metres) were randomly placed in various habitats around the periphery of a breeding pond. Trapped salamanders were measured, weighed, marked with unique toe clip codes and released. This will be repeated during the summer of '95.

Vegetation plots 0.04 ha in size were studied at each array site. Among the habitat variables studied were: species and number of trees and snags, species and number of saplings, shrub species and

number of stems, % ground cover by species, coarse woody debris, detritus depth and composition and soil composition. Aquatic habitat variables at breeding and proximate nonbreeding ponds will be examined in the coming year.

Over 400 salamanders were collected during the summer of 1994 and more may be collected during the summer of 1995. Allozyme electrophoresis and DNA techniques will be used to look at the genetic variation between populations from which the genetic relatedness of the populations can be inferred.

It appears based on results to date that the Long-toed Salamander is not as rare as originally thought. This may be due to a lack of good inventory data or the past focus on large game animals for most inventory and research work.

Barred Owl

Barred Owl Habitat Use and Distribution in the Foothills Model Forest

There is very little written on the barred owls of the boreal forest. They are of interest to forest managers because of their possible mature/old growth dependence.

This project is intended to validate the U.S. Fish and Wildlife HSI model for the barred owl by testing the adequacy of available habitat inventory data for predicting species responses, refining habitat inventory procedures to increase model reliability, and identifying false model assumptions.

A protocol for censusing owls was established in the spring after participation in a number of winter bird counts. This has resulted in ten transects being randomly laid over 100 townships in the Model Forest. All have been visited at least once with two definite pairs identified as well as seven individuals.

Volunteers are being solicited from the University of Alberta and Northern Alberta Institute of Technology to assist in running transects.

Neotropical Migrant Passerine (Songbird) Distribution, Abundance, and Reproductive Success in the Boreal Forest

In response to recent declines in populations of neotropical migrant passerines in North America, numerous studies have addressed breeding habitat associations for these birds and have incorporated these associations into habitat suitability index (HSI) models.

A major assumption inherent in the habitat-wildlife modelling approach is that density or abundance of a species is a good

indicator of the suitability of a given habitat to that species. Despite recent evidence that density is often not related to habitat quality, this assumption has remained largely unchallenged. To construct useful HSI models, the relationship between reproductive success and density, as model performance variables, requires evaluation. Identification of habitat characteristics chosen by birds to enhance reproductive success will facilitate the development of more reliable HSI models and facilitate landscape level forecasting for the forest industry. The HSI model assumption that density is a reliable indicator of habitat suitability will be tested for selected species amenable to the development of indices of reproductive success.

The primary objective of this study is to build on previous evaluations of forest habitat use by neotropical migrant passerines breeding in the Foothills Model Forest, providing the basis for refining and validating existing HSI models for several species.

The experimental design for this is currently being finalized to incorporate point counts, spot mapping, mist-netting, reproductive censuses, artificial nest predation experiments, intensive nest searches and vegetation sampling into the study. Field sampling will begin in the spring of 1995.

Northern Goshawk Habitat Characterization in the Foothills Model Forest

The Northern Goshawk is the largest North American member of the genus Accipiter. Estimates of home range size for North American goshawk populations vary from 210 hectares to 2500 hectares. Goshawks are a raptor species and consume a great variety of prey species. Studies have concluded that suitable nesting habitat and food availability are critical factors in determining goshawk populations in an area. Modern forestry practices may cause alterations to habitat that will threaten goshawk populations. The goal of this project is to develop and verify a habitat suitability index model for goshawk populations on the Foothills Model Forest area by using original observation, consultation with scientific literature, local knowledge, and preliminary HSI models developed for the two main goshawk prey species (snowshoe hare and ruffed grouse).

A preliminary HSI model for the Northern Goshawk has been prepared and an intensive literature review and discussions with various sources has helped to refine the field techniques and analysis protocols that will be used in the coming field season. Reliable goshawk sighting information is being investigated for future sampling/transect work.

Spatial Habitat Suitability Models for Mule Deer and Whitetail Deer in the Alberta Foothills Forest region

The Rocky Mountain mule deer is the only subspecies of mule deer present in Alberta. White-tailed deer generally have fared better than mule deer and have expanded their range with development perhaps at the expense of mule deer. The biological needs of mule deer can be met largely under a variety of timber stand rotation ages and intensities of management, however, attention must be paid to how these animals respond to landscape change and the sensory disturbances associated with these changes.

This study deals with the development,

implementation, calibration and validation of habitat suitability indices (HSI) for mule deer and white-tailed deer. It also explores functional interactions of these two species and evaluates their importance to the HSI approach.

A literature review has been largely completed and will continue throughout the study. A trapping and radio-collaring program has been initiated using clover traps and will continue in the 1995 fiscal year.

Ecosystem Disturbance and Mammal Distribution Patterns in the Foothills Model Forest

This project is a modification of the 1994/95 project entitled "Mammal Inventories in the Foothills Forest". The objectives of the 1994/95 program have been re-defined based on preliminary research results, and additional objectives directed towards defining ecosystem disturbance processes have been incorporated.

1) Ecosystem Disturbance

The recognition of disturbance as a fundamental ecosystem process influencing natural ranges of variation is not new but it has recently been refined as a useful context for forest management and conservation. Guidelines developed by the US Forest Service explicitly recognize the critical role of disturbance processes at all scales in maintaining ecosystem composition, structure and function. Canadian agencies developing similar approaches (e.g., Canadian Council of Forest Ministers). There are, however, few specific attempts to estimate natural ranges of variation in disturbance across major forest ecosystems.

Defining disturbance processes and their effects on the forest mosaic is a complex task, and we have limited this project to include the intensity of natural and anthropogenic (man-caused) disturbances. A joint research initiative proposed by the Foothills Model Forest and Weldwood of Canada will complement this project by examining historical ranges of disturbance frequency and size associated with natural and anthropogenic processes.

The Ecosystem Disturbance component of this project addresses a major information gap by estimating the natural range of variability in ecosystem structure and composition in areas burned by forest fire 40 years ago, compared to areas disturbed by logging around the same year. Because obtaining a complete inventory of structural and compositional attributes is impractical, we propose to use three indicators of disturbance intensity, namely the distribution and abundance of snags (standing dead trees), coarse woody material, small mammals, and cavity-nesting birds.

Stand disturbed by fire

Populations of small mammals and cavity nesting birds are functionally related to the abundance and distribution of snags and coarse woody material, and understanding these relationships will further advance

prospects for successful integration of forestry and wildlife habitat.

2) Mammal Distribution Patterns
Information on the distribution of mammal species among natural regions and habitats in the Foothills Model Forest is required to more fully integrate timber harvest planning with wildlife habitat requirements. The Habitat Supply Analysis module of the Foothills Model Forest DSS will use HSI models to predict future habitat supply for 35 vertebrate species selected to represent a range of habitat associations. These models, 15 of which are for mammals, need to be tested to determine their predictive ability. Data from this project will provide preliminary distribution information for many of the 59 species of mammals that occur within the Foothills Model Forest, and will provide more detailed habitat information that can be used to test some of the 15 proposed mammal HSI models. A combination of snow-tracking and wildlife observation cards are being used to obtain this information.

Red Squirrel Habitat Use

Several aspects of squirrel population biology have been documented however, the methodology used was not thorough with respect to individual animal identification and reproductive output, and data were used from commercial trapping records and trapping estimates (not entire censuses) to determine demographic parameters. This information does little to tell us how to manage forests in order to conserve critical habitat types for red squirrels.

In addition to the development of a HSI model for red squirrels, work is now underway that will allow us to compare reproductive biology of squirrels in spruce, pine and mixed-wood habitats noting any differences in the proportion of the population breeding, the condition of individual animals, the reproductive output of the individuals breeding, immigration, emigration, territory turnover and survival.

Several areas have been chosen for intensive live trapping of red squirrels, all located within 30 km of Hinton. Four main habitat types have been chosen for study and include mature lodgepole pine (100 yrs+), mature white spruce (100 yrs+), mature mixed wood (pine/white spruce mixed 100 yrs+) and younger fire origin pine (40 yrs old). Four areas will be chosen for each habitat type. All pine, spruce and mixed wood areas will be selected by the spring of 1995. To date, five areas have been gridded and prebaited and traps have been placed systematically on the grids.

Modelling Soil Compaction, Decompaction, and Tree Growth on Alberta Forest Soils following Forest Harvesting

Summer logging of boreal and foothill forests in Alberta is increasing the potential for soil compaction by harvesting equipment. To address this concern, a study is underway to develop models of soil compaction by skidders, determine the natural rate of soil decompaction, and quantify any detrimental effects that soil compaction may have on survival and growth of planted conifer seedlings.

In 1994 eight sites were established in an area bounded by Grande Prairie, Swan Hills, and Rocky Mountain House. At each site, four replications of four levels of skidding activity were established. Soil bulk density, soil water content, and air-

filled porosity were measured in each treatment at an average depth of 5, 10, and 20 cm. The infiltration rate of the mineral soil was also measured. Undisturbed cores were collected to determine saturated hydraulic conductivity and soil water retention in the laboratory.

Preliminary analysis of the first year data found significant increases in bulk density and decreases in air-filled porosity and infiltration rate at most sites after 3 or 7 skidding cycles. Further traffic on soil after these initial cycles caused little additional change. Soil water content was the primary factor determining whether a soil was significantly compacted.

Seven additional sites will be established in 1995 with remeasurement of the original sites also slated for completion. Weather stations will be installed to monitor climatic and soil conditions and conifer seedlings planted after site preparation. Seedling performance will be monitored annually for five years.

A Shelterwood Silvicultural System for Enhancement of White Spruce Regeneration in Mixedwood Cover Types

Recent dramatic increases in demand for the deciduous component of mixedwood stands, characterized by trembling aspen, balsam poplar, and white spruce, commonly as an understory has coincided with increased concern about alternatives to clearcutting and maintenance of the relatively diverse composition, structure and function of mixedwoods (biodiversity).

Mixedwoods common to the Foothills Model Forest are ecologically suited to management by systems other than clearcutting, particularly shelterwood, which can be adapted to facilitate enhancing and protecting natural spruce regeneration.

The application of shelterwood silviculture to white spruce management is not new in western Canada. It has historically been researched and practised most successfully in stands with a high coniferous content, prior to the introduction of modern mechanized harvesting equipment. The Foothills Model Forest, in collaboration with the University of Alberta and the Canadian Forest Service, have initiated a project based on the adaptation of shelterwood silviculture to enhance and protect natural white spruce regeneration in mixedwoods with a high deciduous content, using modern mechanized harvesting equipment

A mixedwood stand in the Marlboro Working Circle, north of Medicine Lodge was cut in several different configurations in the late winter of 1994. The experiment included a clearcut, a no-cut control, a low and a high removal seeding-cut, laid out in 150 X 150 m plots. This set of treatments was replicated in the same area. The partial cut treatments were hand-felled and line skidded. Each of the eight plots was given three site preparation treatments: blade scarification, mixing with a Merri Crusher powered drum mixing device and no treatment. This entire experimental design will be replicated on another site in 1995.

In 1995 soil temperature thermocouples were established at 10 and 20 cm depths in each of the plots. Air temperatures were measured daily at 50 and 130 cm height in the clear cut, the low removal and the control cuts in both of the replicate plots. Preliminary data indicate that the low removal plot was approximately 3 ° C warmer at night than the clearcut and did

not experience any summer frost events, compared to 4 nights with frost in the clearcut.

Soil moisture was assessed in three locations, in each site preparation treatment at 15-30cm, 30-45cm and 45-75cm depths using a TDR instrument. Light transmission was measured near solar noon in mid-summer on clear days in all of the plots with a canopy, using a ceptometer. In each of the site preparation plots, 10 groups of 5 white spruce seedlings were planted and will be monitored for survival and growth in the coming year. The re-growth of the shrub/herb layer was monitored in each of the treatments. In 1995, these features will be remeasured and white spruce and natural aspen regeneration will be assessed.

Silvicultural Impacts of Chipper Residue Disposal

Wood that may not have been economical to harvest and haul to the mill is now becoming economical through the process of remote chipping. With the procedure of remote chipping, the chipper residue is put back onto the site. This activity has certain potential benefits - it greatly reduces or can even eliminate the need to burn debris; it increases the amount of organic matter in the soil which may decrease the soil bulk density; and it may increase the water holding capacity of the soil. Along with these potential benefits also come some potential problems. Woody debris can create a nitrogen fixation problem. Although woody debris is a long-term nitrogen source, it is a short-term nitrogen sink. This has the potential to be a major problem in the first few years when the lodgepole pine crop trees are under heaviest pressure from competition such as grasses. For this reason, fertilizers heavy in nitrogen may be required. Another possible detrimental effect is that the woody debris may have an insulating effect, thereby delaying the spring thaw and, in effect, shortening the growing season. This could be of special importance in cold boreal soils where growing seasons are already relatively short. These potential problems could have severe consequences on the regenerative capabilities of the harvested stands.

Although chipper residue is currently being disposed of on site, and will possibly become an even more common practice, very little information presently exists on the effects of woody debris on forest soils and the corresponding growth of crop trees. A study is now underway to determine whether or not this process can be a beneficial silvicultural tool.

Chipper residue blocks were scarified in August of 1994 and the site was planted with lodgepole pine seedlings. A severe hail storm severely damaged the planted stock to the extent that a decision was made to remove the seedlings and replant in the spring of 1995.

Soil samples were collected from the LFH layer and the top two mineral horizons prior to the initial harvest in September, 1993. Samples were again collected immediately after the chipper residue was spread on the site and in September of 1994, approximately one year after the residue was applied. Chemical analysis of the first sampling has been completed and indicates that the residue is low in nitrogen, phosphorus and sulphur. The carbon content of the plant material is about 45%. Past studies indicate that C:N ratios from 25-35:1 result in much of the available nitrogen being tied up and

unavailable for plant uptake in the short-term. The same may also be true for both phosphorus and sulphur.

Additional soil sampling and foliar analysis will take place in 1995.

Validation of Basal Diameter Ratio Competition Index for Pine-Aspen

Performance expectations for juvenile conifers have been incorporated into new free-to-grow regeneration standards in Alberta and extensive conifer release programs are implemented annually to bring regenerated stands to the provincially-targeted standards. Selecting stands for the best response to and economic return from release treatments is difficult because of the high cost of treatment and limited information available on biological efficacy.

The Canadian Forest Service has completed a project on lodgepole pine, aspen competition. The objective of this study was to select or develop a competition index for quantifying the level of aspen competition that best predicts lodgepole pine growth. Based on this study, a new competition index, called the Basal Diameter Ratio (BDR) was developed which is a simplification of Lorimer's (1983) competition index:

$$CI = \frac{\textit{tallest aspen basal diameter}}{\textit{lodgepole pine basal diameter}}$$

This index was developed for lodgepole pine-aspen regeneration in west-central Alberta, but the study did not include actual release response assessment. The pine growth responses must be confirmed by field experiments before the index is used for stand tending decisions.

In 1993, initial vegetation and conifer measurements and aspen removal were completed. This was followed by the first year post-treatment response data collection in August, 1994. Data analysis has been carried out and a progress report submitted to the Foothills Model Forest.

First year results indicate that there are (for some growth response variables and for some blocks), significant differences in growth response between no removal and full removal of aspen within 1.8 metres of conifers. This relationship is most pronounced for radial increment. There are, however, no significant differences in pine growth response for the intermediate removal treatments on basal diameter ratios of 0.75 and 1.0 one year after treatment.

Second year post-treatment measurements will be taken in the coming summer.

Tree Growth and Stand Yield Impacts of Basal Girdling by Small Mammals in Pole-sized Lodgepole Pine

Stem bark chewing and basal girdling by small mammals, mainly red squirrels and snowshoe hares, has long been recognized as a possible cause of significant damage in young lodgepole pine stands.

From a timber management perspective, the impact of chewing damage on diameter and height growth is particularly important. Because of past conflicting results, this study was initiated to clear up inconsistencies in growth response to bark damage and to develop a model that can predict lodgepole pine growth after different levels of damage near the ground.

Some 18 stands and 250 trees were sampled in the summer of 1994 where

mammal damage was particularly severe. Sampled stands were between 15 and 35 years of age in two after-thinning density groups (both fairly open). Sampled stems represented a full range of damage from no chewing to complete girdling. Sample trees were felled, dimensional measurements taken and stem discs taken to determine radial increment and to determine the amount and time of damage near ground level. Statistical analysis and report preparation is now being carried out.

Aspen Regrowth and Competition after Release of Conifers

Manual and manual-mechanical release of lodgepole pine from aspen competition is increasingly used in implementation of provincial free-to-grow regeneration standards. Aspen regrowth after release (by suckering from roots, root collar and reshooting from the stems) often necessitates repeated treatments and may negate tending investments. Preliminary Canadian Forest Service trials suggest that proper release techniques could greatly improve the efficacy and cost-benefits of release treatments.

Very little is known about how the time of release cut, type of cut, and height of cut affects the density and growth of aspen, and how these processes are in turn related and controlled by aspen size and age. Dynamics of aspen competition, development of juvenile mixed stands, and their impact on softwood growth and yield and annual allowable cut (AAC) after release are virtually unknown.

The Foothills Model Forest has initiated this study to determine the best timing and cutting technique that would reduce aspen regrowth and competition after release; simultaneously to improve the understanding of vegetative processes (ie. resuckering, reshooting) of cut juvenile aspen, and; to quantify responses after release in terms of: a. aspen density and growth; b. height and radial growth of released pine; c. ingress of other competition, (ie. Calamagrostis, alnus); d. overall competition levels affecting conifer growth, and the formulation of tending prescriptions for lodgepole pine.

Three trials have been scheduled in this study to incorporate release treatments at various critical phenological stages. These include time of flush, release at peak of height growth, release at termination of height growth and release during winter dormancy.

All three trial sites have been selected and baseline measurements carried out. First and second year measurements have been completed on trials A and B with additional measurements slated for the coming summer.

Trial C had the winter dormancy cuts completed in March of 1995. Additional treatments will be done in August and November of 1995.

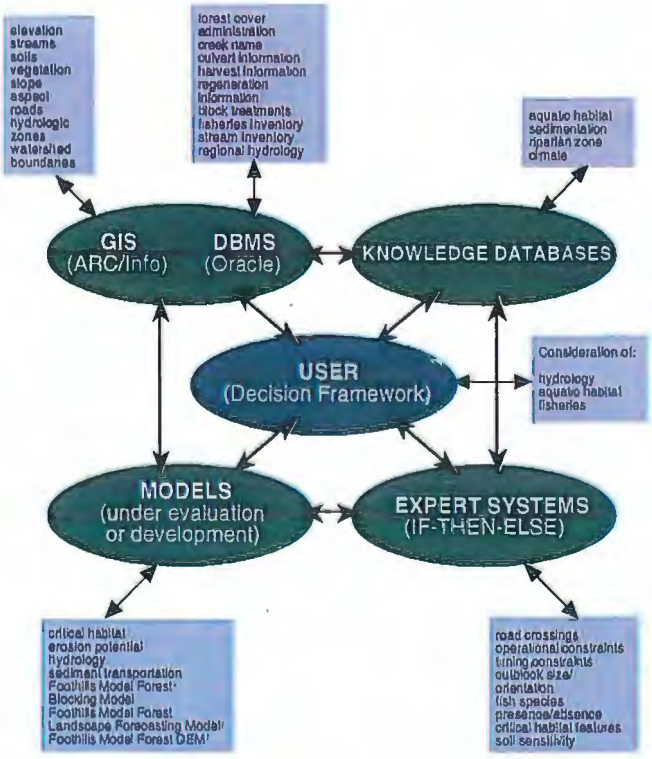
Watershed Program

The Foothills Model Forest contains more than 4,000 km of rivers and streams and more than 100 lakes and ponds. There are 24 fish species that can be found locally with 12 of those in demand by anglers. Watershed protection is the most important resource priority identified in the provincial Eastern Slopes Policy. In an effort to better understand the potential impacts of resource use on fisheries and aquatic resources, the watershed program for the Foothills Model Forest commenced work in

the summer of 1994.

A full-time Watershed Coordinator was hired in July to implement the "Strategic Plan for Development of a Watershed Assessment Model (WAM)", developed at a workshop in January of 1994. The coordinator was assigned the tasks of developing a workplan for the program to 1997, securing external funding for the majority of the program and developing strong partnerships with government and other industrial forest users.

Some of the projects that have now been initiated include a Regional Hydrology Study which began in February and will be completed in late 1995. This study uses existing hydrometric data to develop methods to predict streamflow, including peak flows and low flows, on streams within the Foothills Model Forest. This information will be a benefit in planning roads and timber harvesting and in evaluating impacts on the fish resource.



Draft Foothills Model Forest Watershed Assessment Model

The development of a Watershed Assessment Model (WAM) is also underway. WAM will be part of the ecologically based DSS and all projects within the watershed program have links to WAM.

Additional projects to be initiated in early 1995/96 include:

1. Fisheries and Stream Inventory - a joint operational field inventory of the fisheries and aquatic habitat resources in Foothills Model Forest in partnership with Weldwood of Canada Ltd. (Hinton Division).

2. Fisheries and Aquatic Habitat Database - development of a computer database, accessed by species, of habitat requirements for the four major sportfish species in this area: bull trout, Arctic grayling, mountain whitefish and Athabasca rainbow trout.

3. Sediment Intrusion - graduate student research to evaluate sediment stored in the stream bedload and to develop an easy-to-use field measurement tool.

4. Sedimentation Impacts - in partnership with Department of Fisheries and Oceans, Alberta Environmental Protection and oil and gas companies, research the impacts of sedimentation on the fisheries resource.

Horse Grazing: Impacts and Strategies

Horses, both feral and otherwise, have in the past, and continue to be the cause of controversy in regards to their effect on new regeneration on timber cutblocks. There are conflicting conclusions concerning the cause and effect of horse

damage to seedlings.

This study is examining how horses use confined, semi-confined and free-ranging areas of the forest for grazing. Various types of seedling damage and intensity of use have been noted to date with preferences towards cutlines, wetlands and pine sites.

Grazing behaviour data is currently being tabulated and analysed for the three study types and additional data will be collected in 1995.

Carbon Budget Model For the Foothills Model Forest

The purpose of this study is to modify the carbon budget model of the Canadian forestry sector (CBM-CFS), as developed collaboratively by the Canadian Forest Service and ESSA Ltd., so that it can be used to derive an estimate of the current and historical carbon budgets of the Foothills Model Forest, and other management areas (if suitable input data are available). This will be an assessment of the carbon currently contained in the forest (including vegetation, soils, wetlands and forest products), and of net annual changes (gains and losses) in these pools, due to growth, decomposition, ecosystem disturbances and human activity.

During 1994/95, staff from Jasper National Park worked with the CFS to complete modifications to the CBM and to test and debug it for use over the entire Model Forest area. An experimental run of the model was conducted to compare the carbon budget of the Model Forest with that of a "natural forest" in which only natural processes such as fire and insects and disease were considered. This run suggests that active management actually has a favourable effect with respect to the amount of stored versus released carbon (ie. more stored that released).

During 1995, the Canadian Forest Service will look at the effect of silvicultural treatments and increased tree volume growth on carbon stored as biomass.

Socio-Economic Research Program for the Foothills Model Forest

The Foothills Model Forest lists among its goals and objectives furthering our understanding of environmental, economic, social, cultural and spiritual values; developing and coordinating processes to facilitate consensus building and dispute resolution; and achieving integrated resource management.

The overall thrust of the Foothills Model Forest socio-economic program is to identify the stakeholders of the forest and to document their values, attitudes and perceptions regarding the sustainability of resource management in the region. It will also document stakeholders perceptions on how they and/or their group fits into the resource decision making framework. The research program will provide comprehensive documentation on and analysis of existing public input and involvement mechanisms as well as a substantive historical and contemporary analysis of the social, cultural, and economic importance of the various natural resource sectors to the region, the province and the country as a whole.

The different components of the program will also interface with the Foothills Model Forest Decision Support System now under development. Quantitative models will be developed on the regional economy and on recreation user behaviour. Input-output

analysis will provide a snapshot of the economic interdependencies existing in the region. Shocks can then be applied to the snapshot, usually in the form of policy changes and the model can be computed once again. Changes in results can be interpreted as the effects of the policy. Computable General Equilibrium is a more sophisticated form of quantitative economic modelling that better addresses some of the restrictive constraints imposed by I-O models. Recreation models will predict changes in user behaviour given changes in the resource base, the recreation infrastructure, and policies regulating those activities (e.g. user fees, access restrictions, etc.)

A social science research program will also contribute to the DSS by providing managers with information on the economic feasibility, the social acceptability, and the political ramifications of various management scenarios. In other words, the socio-economic analyses will help in defining the parameters of what should go into the decision support system for comparative analysis.

Finally, the analysis of public involvement mechanisms for resource management will include an analysis of public input into the Foothills Model Forest DSS. The socio-economic program will evaluate the overall efficacy of the DSS from the perspective of the various stakeholder groups.

Developmental work in all of these subject areas took place in the latter part of 1994/95 with full implementation of the program expected in 1995.

Environmentally Significant Areas Study

An integrated resource management philosophy must include conservation and sustainable development as a basic philosophy. A complimentary and equally essential element of sustainable development is the establishment of a network of protected areas that conserve forest biodiversity, including genetic, species, ecosystem, spatial, and temporal aspects.

The Foothills Model Forest Environmentally Significant Areas program was devised based on three basic objectives including;

- to develop an inventory of undisturbed or relatively undisturbed ecosystems, including currently protected areas and other lands.
- to identify ecosystems and areas that may be suitable and desirable for protection and to make such recommendations to the Department of Environmental Protection.
- to incorporate undisturbed/protected ecosystem objectives into integrated resource management strategies.

The phased approach taken by the Foothills Model Forest program was intended to compliment not only the federal government's ecological reserves sub-program but Alberta's fledgling Special Places 2000 initiative.

Phase 1 of the study involved the development of a broad preliminary inventory of areas that may have been of some environmental significance. This was completed in 1994.

Phase 2 involved the development of a complete slope-class delineation for the entire Foothills Model Forest landbase based on slope-class delineations used in

the West-Central Guide to Ecological Classification with the intent of being able to test run NAIA ecological classification software, (referred to in the Information, Research and Knowledge section), on potential sites. This component was completed in the spring of 1995.

The third and final phase includes the development and implementation of a process for detailed ground truthing and submission to the appropriate approval bodies for consideration as a protected area. This will hopefully be carried out in the coming year if funding is available.

Communications

The Foothills Model Forest communications program experienced some change in 1994/95.

New emphasis was placed on communication with the partners. By hiring a partner liaison officer, we hope to better maintain and enhance our relationships with the various stakeholders and interest groups associated with the Foothills Model Forest.

A strong focus on local communication initiatives has been well received and is helping us to build the foundation for larger communications initiatives.

Community outreach has become a bigger focus. We have become more active with schools and other organizations in the area. A volunteer program has also been created to give people an opportunity to experience the work of an environmental researcher with approximately 30 individuals expressing interest to date.

Numerous field tours involving local, national and international groups from as far away as Japan, Germany, Mexico, and China continue to help promote both the Foothills Model Forest and the Model Forest Network.

Two different public opinion polls of residents in the Model Forest have been conducted in the last year. Many helpful points were brought out by both polls and these helped us to refine our communications plan and to be more effective and efficient in the future.

Chihuahua Model Forest

The Foothills Model Forest formally became involved in the International Model Forest program in late 1993 by twinning with the Chihuahua Model Forest in Mexico. The Administrator of the Foothills Model Forest has significant involvement with our Mexican counterpart in his role as the "Canadian Agent" for the Department of Foreign Affairs and International Trade. This involves the administration of Canadian funds, monitoring the development and implementation of work plans, and reporting progress to the Government of Canada.

The Chihuahua Model Forest, situated in the heart of the Sierra Madre Tarahumara Mountains, just to the north east of the world renowned Copper Canyon, experienced the challenges associated with the change of the federal government, Mexico's economic crisis and one of the most severe droughts in its recorded history. Notwithstanding these challenges the Chihuahua Model Forest made excellent progress in a number of projects. Important progress has been made in the area of forming partnerships, bringing together fragmented data from numerous sources and making this information

available to various users.

In 1995/96 INIFAP (the Federal Government Research Institute for Agriculture and Forestry) will be playing a lead role in the Pollution Control, Pisciculture, Agriculture, Silviculture and Picea Chihuahuana projects. Another very important agreement is with the University of Chihuahua's Faculty of Animal Sciences who will be playing a lead role in the Communications, Geographic Information Systems, and Wildlife projects.

Aquaculture tanks in the Ejido of San Juanito

During 1994/95 significant progress was made in the GIS project, which is the first significant effort being made in Chihuahua to use this technology in an actual natural resource management application. Also breaking ground in natural resource management is the Chihuahua Model Forest's Wildlife Project. Several endangered species are being studied with a view to managing these resources by establishing protected areas as required.

The Chihuahua Model Forest has embarked on an ambitious environmental education program which also forms the basis for the Evaluation Framework project.

Auditor's Report

To the Board of Directors of Foothills Model Forest

I have audited the balance sheets of the Canadian Forest Service Fund, the Contribution Fund and the Chihuahua Model Forest Fund of Foothills Model Forest as at March 31, 1995 and the statements of receipts and expenditures for the year then ended. These financial statements are the responsibility of the management of Foothills Model Forest. My responsibility is to express an opinion on these financial statements based on our audit.

I conducted my audit in accordance with generally accepted auditing standards. These standards require that I plan and perform an audit to obtain reasonable assurance whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management as well as evaluating the overall financial statement presentation.

In my opinion, these financial statements present fairly, in all material aspects, the financial position of the funds as at March 31, 1995 and receipts and expenditures for the year then ended in accordance with the accounting policies described in Note 1 to these financial statements.

Hinton, Alberta

May 31, 1995

C. L. Brown

Chartered Accountant

C.L. (Les) Brown Professional Corporation

Foothills Model Forest
Canadian Forest Service Fund
Balance Sheet
(as at March 31, 1995)

ASSETS

	1995 $	1994 $
CURRENT		
Cash (Note 5)	92,365	94
Accounts receivable	11,087	-
Prepaid expense	81,015	107,448
Due from Contribution Fund	-	45,824
	184,467	153,366

LIABILITIES

CURRENT		
Accounts payable	21,287	1,138
Accrued payroll	8,186	-
	29,473	1,138
FUND BALANCE	154,994	152,228
	184,467	153,366

C.L. (Les) Brown Professional Corporation

Foothills Model Forest
Canadian Forest Service Fund
Statement of Receipts, Expenditures, and Fund Balance
(for the year ended March 31, 1995)

	1995 $	1994 $
RECEIPTS		
Government of Canada	1,012,000	670,000
EXPENDITURES		
Information, research and knowledge	462,371	422,472
Integrated resource management	293,830	172,440
Communications	111,903	109,109
Project management and administration (Note 2c)	141,130	104,552
Other	-	54,359
	1,009,234	862,932
EXCESS (DEFICIENCY) OF RECEIPTS OVER EXPENDITURES	2,766	(192,932)
FUND BALANCE, BEGINNING OF YEAR	152,228	345,160
FUND BALANCE, END OF YEAR	154,994	152,228

C.L. (Les) Brown Professional Corporation

Foothills Model Forest Contribution Fund Balance Sheet

(as at March 31, 1995)

ASSETS

	1995 $	1994 $
CURRENT		
Cash	268,830	124,588
Accounts receivable	26,010	31,625
G.S.T. receivable	14,061	-
Inventory	-	394
	308,902	156,607

LIABILITIES

CURRENT		
Accounts payable	31,459	11,104
Due to Canadian Forest Service Fund	-	45,824
Holdbacks	1,335	-
Other	1,692	1,692
	34,486	58,620
FUND BALANCE	274,416	97,987
	308,902	156,607

C.L. (Les) Brown Professional Corporation

Foothills Model Forest
Contribution Fund
Statement of Receipts, Expenditures, and Fund Balance
(for the year ended March 31, 1995)

	APRIL 1/94 FUND BALANCE $	CURRENT YEAR RECEIPTS $	CURRENT YEAR EXPENDITURES $	MARCH 31/95 FUND BALANCE $
Information, Research and Knowledge				
Protected Areas Permanent Sample Plots Study	(449)	-	(449)	-
Ecologically Classify Forest	-	20,000	17,176	2,824
GIS Technology Transfer	10,711	8,303	10,714	8,300
Lichen Study	-	21,599	21,599	-
Habitat Supply Model	12,500	7,608	19,608	500
Terrestrial Wildlife	-	56,840	-	56,840
Northern Goshawk	-	11,000	11,000	-
Barred Owl	-	11,000	11,000	-
Mule/White Tailed Deer	-	15,160	15,160	-
Neo-tropical Migrant Birds	-	2,000	2,000	-
Watershed Assessment Model	-	33,210	7,472	25,738
Summer Woodpecker	-	4,000	4,000	-
Pileated Woodpecker Study	4,291	28,370	24,596	8,065
	27,053	219,090	143,876	102,267
Integrated Resource Management				
Bird Inventory	3,000	-	3,000	-
Environmentally Sensitive Areas Study	6,949	22,000	20,200	8,749
Elk Study	467	750	296	921
Soil Compaction, Decompaction and Tree Growth	-	24,250	14,019	10,231
Ecologically Based Preharvest Planning	-	14,000	7,313	6,687
Forest Carbon Budget Study	-	20,000	-	20,000
	10,416	81,000	44,828	46,588
Project Management and Administration				
General (Note 2c)	54,409	65,072	1,180	118,301
Interactive Systems	442	-	-	442
Fire Behaviour Projects	5,667	1,151	-	6,818
	60,518	66,223	1,180	125,561
	97,987	366,313	189,884	274,416

C.L. (Les) Brown Professional Corporation

Foothills Model Forest
Chihuahua Model Forest Fund
Balance Sheet
(as at March 31, 1995)

ASSETS

	1995 $	1994 $
CURRENT		
Accounts receivable	-	830
G.S.T. receivable	1,314	1,589
Due from Foreign Affairs	66,651	-
	67,965	2,419

LIABILITIES

CURRENT		
Bank indebtedness	4,363	1,942
Accounts payable	62,000	-
	66,363	1,942
FUND BALANCE	1,602	477
	67,965	2,419

C.L. (Les) Brown Professional Corporation

Foothills Model Forest
Chihuahua Model Forest Fund
Statement of Receipts, Expenditures, and Fund Balance
(for the year ended March 31, 1995)

	1995 $	1994 $
RECEIPTS		
Government of Canada	500,000	97,500
Interest	767	65
G.S.T. recovery	4,718	-
	505,485	97,565
EXPENDITURES		
Canadian Agent Co-ordination:		
Administration services	34,189	6,867
Banking costs	344	-
Computer and software	-	15,374
Consultant travel	11,121	1,870
Consultant fees	11,365	1,750
Contract Manager	-	4,375
Interest costs	788	-
Office operation	7,431	3,081
Organization costs	-	2,000
Translation services	337	-
Travel to Chihuahua	8,835	-
Travel in Canada	3,835	11,016
Vehicles	-	31,380
Workshops	-	13,625
	78,245	91,338
Bosque Modelo Chihuahua:		
Mexicans' travel within Canada	5,115	5,750
Transfers to Bosque Modelo Chihuahua	421,000	-
	426,115	5,750
	504,360	97,088
EXCESS OF RECEIPTS OVER EXPENDITURES	1,125	477
FUND BALANCE, BEGINNING OF YEAR	477	-
FUND BALANCE, END OF YEAR	1,602	447

C.L. (Les) Brown Professional Corporation

Foothills Model Forest
Notes to Financial Statements
(for the year ended March 31, 1995)

1. INCORPORATION AND OBJECTIVES

Foothills Model Forest was incorporated in Alberta on November 2, 1992 as a non-profit company under Part 9 of the Companies Act of Alberta. The company is owned equally by Weldwood of Canada Limited (Hinton Division) and the Government of Alberta.

a) The objects for which the company was established are:

i) to accelerate and expand new and existing initiatives in sustainable forest operations innovation, integrated resource management, decision support systems research, technology transfer and public involvement in the Foothills Model Forest;

ii) to support the development of multi-jurisdictional resource management strategies and programs, particularly regarding transboundary resources;

iii) to test and demonstrate on the Foothills Model Forest advanced technology and integrated resource management practices consistent with the principles of sustainable development;

iv) to use the expertise and facilities of the Environmental Training Centre to assist in the knowledge base development and transfer the knowledge gained in the Foothills Model Forest program to local, national and international resource managers and various publics;

v) to develop an integrated resource management strategy for the Foothills Model Forest, representing a balance of integrated resource management objectives, using consensus development techniques, with the participation of representative stakeholders; and

vi) to support the Foothills Model Forest in the delivery of the 5-year Model Forest Plan and the Annual Work Plan.

b) Foothills Model Forest is comprised of three funds:

i) the Canadian Forest Service Fund

The Canadian Forest Service Fund is funded by the Government of Canada through the Department of Natural Resources. The funding is expended on the projects approved within the annual work plan.

ii) the Contribution Fund

The Contribution Fund receives cash contributions from government, industry and various partners which fund specific projects.

iii) The Chihuahua Model Forest Fund

The Chihuahua Model Forest Fund is funded by the Government of Canada through annual Contribution Agreements with the Department of Foreign Affairs and International Trade. The objective for creation of the fund was to administer Canadian government funding of the Chihuahua Model Forest Work Plan.

2. ACCOUNTING POLICIES

a) Receipts and disbursements are recorded on the accrual basis.

b) Non-cash contributions have not been recorded in these accounts.

c) Goods and Services Tax:

Goods and services input tax credits earned through expenditures of the Canadian Forest Service Fund are recorded as contributions to the Contribution Fund. In the current year, these input tax credits totalled $31,928 which is included in total for project management and administration expenditures.

3. SUBSEQUENT EVENT

Effective May 1, 1995, Foothills Forest changed its name to Foothills Model Forest.

4. CONTINGENT LIABILITY

Services were obtained during and throughout the initial two years of activity on a contractual basis. Revenue Canada has indicated that certain contacts may constitute

employer/ employee relationships requiring deduction of income tax, Canada Pension Plan and unemployment insurance premiums. To date only one claim has been made by Revenue Canada for $967 and this claim is being appealed.

5. COMMITMENTS

At March 31, 1995, cheques in the amount of $78,700 had been prepared to cover commitments as at March 31, 1995 for prepaid expenses. These cheques were not released as the funds on hand were expected to be required for other purposes.

6. PRIOR YEAR COMPARABLE FIGURES

Prior year figures have been presented except for the receipts and expenditures of the Contribution Fund. Such receipts and expenditures have little significance as the fund represents specific funding for specific projects which are not necessarily comparable.

Foothills Model Forest
Summary of In-Kind Support
(for the year ended March 31, 1995)
(unaudited)

Source	Information, Research & Knowledge	Integrated Resource Management/ Sustainability	Communications/ Public Awareness	Administration/ Program Coordination
Province of Alberta				
Environmental Training Centre	1,600	1,800	10,220	20,200
Land and Forest Service	3,660	1,200	5,000	55,019
Fish and Wildlife	11,112	51,550		3,600
Water Resources	3,000			5,000
Government of Canada				
Canadian Forest Service				
- Canada-Alberta Partnership Agreement in Forestry		77,000		
- Green Plan (Science & Technology)	62,080	122,050		
- CFS A-base Support	18,540			
Jasper National Park	3,000	4,000	3,000	5,000
Canadian Wildlife Service				2,000
Universities				
University of Alberta	4,642			
University of Guelph	2,000			
University of New Brunswick	3,000			
Other Organizations				
Canadian Institute of Forestry				
Yellowhead School Division				1,000
Harry Collinge High School				1,000
Town of Hinton			1,000	1,000
Corporate Sponsors				
Alberta Research Council		40,000		
ESRI Canada	480			1,500
The Forestry Corp.	3,040			2,000
Forey Management		133		
International Colin Energy		1,200		
Nova Corporation	1,800			5,600
Weldwood of Canada Limited (Hinton Division)	33,960	4,952	1,881	21,840
Totals of in-kind contributions (by activity area)	151,914	303,885	21,101	129,759

Total of in-kind contributions for 1994/95 fiscal year - $606,659

FOOTHILLS MODEL FOREST

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