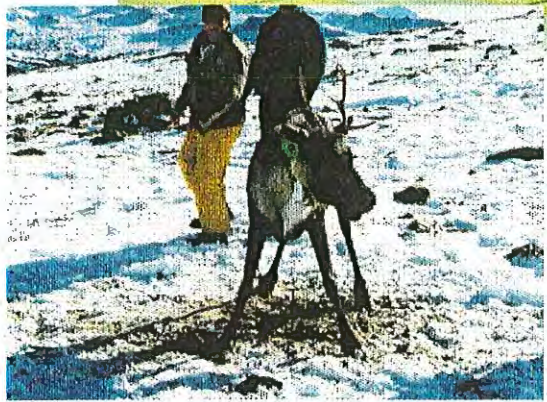
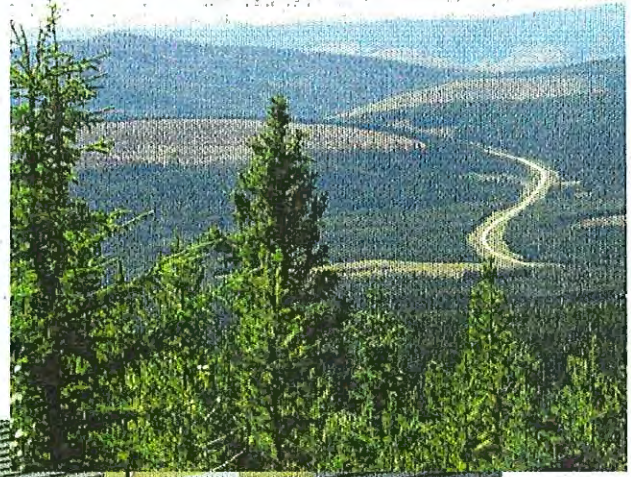
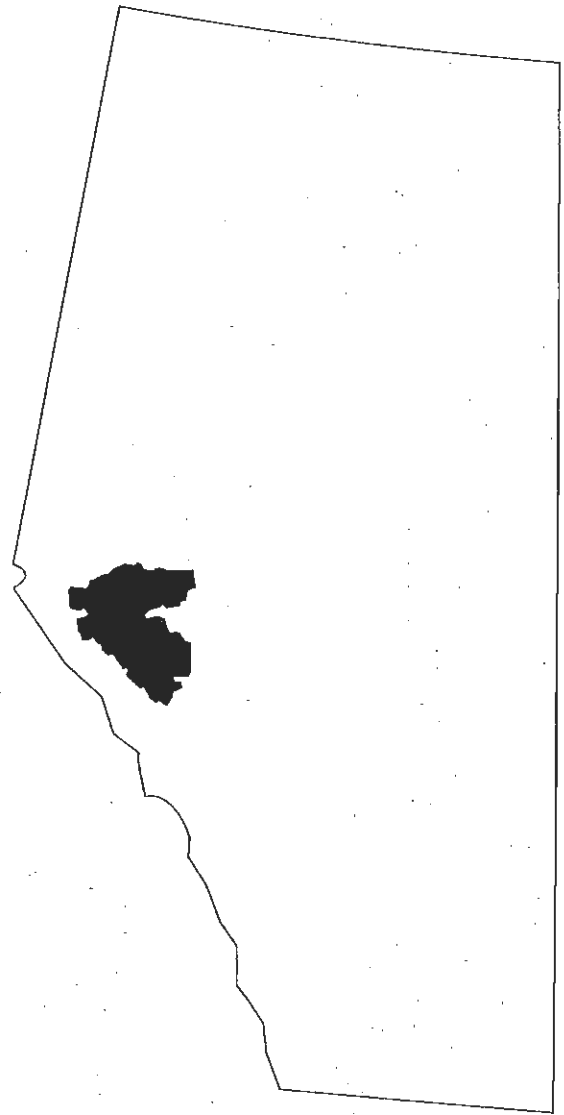
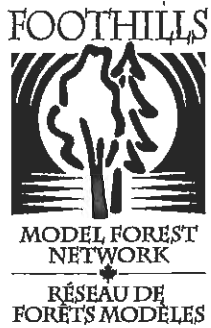


Foothills Forest



1993/94
Annual Report



Foothills Forest
(boreal, subalpine, and montane forest regions)

Weldwood of Canada Limited	1,012,119 ha
Forest Management Agreement Area	
Crown Forest Management Units	202,962 ha
Cache Percotte School Forest	2933 ha
<hr/>	
Total Land Base	1,218,014 ha

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Foothills Forest

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June 30, 1994

Honourable Anne McLellan
Minister of Natural Resources
Room 322, West Block
House of Commons
Wellington Street
Ottawa, Ontario
K1A 0A6

May it please your Honour:

On behalf of the joint venture parties and partners involved in Alberta's Model Forest Project, I respectfully submit the Annual Report of the Foothills Forest for the fiscal year ended March 31, 1994.

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



MODEL FOREST
NETWORK

RÉSEAU DE
FORÊTS MODÈLES

Introduction

The close of the 1993/94 fiscal year marks the end of the Foothills Model Forests first full year in operation. Much has taken place over the course of the past year with respect to our corporation, organizational and administrative structure, and the many research projects and activities that make up Alberta's Model Forest project.

Our original Model Forest proposal document that was submitted to Forestry Canada (now the Canadian Forest Service) in 1992 no longer reflected some of the realities that existed in the Foothills Forest. Available funding, new governments at all levels and the contribution of participating interest groups and individuals created a need to review the forest's original proposal and to develop a strategic plan.

We are happy to say that our new business plan stays true to the original intent of our proposal document and that changes from our original course are, for the most part, in scale rather than substance.

We are moving ahead as planned on many of our programs and have brought additional

activities on line for the coming year to fill perceived gaps in our program. Some existing programs have been revised to more closely follow the direction now provided by our business plan.

Partner cooperation and involvement in our program continues to grow and will hopefully continue to do so for the duration of our tenure as one of Canada's Model Forests. The sharing of ideas, opportunities and risks by such a broad representation of interests is something that makes the Model Forest program unique and will hopefully help it to achieve its goal.

We have had the opportunity to add an international partner to our ranks over the past year by entering into a formal agreement to assist in the administration of one of Canada's International Model Forests, located in Chihuahua, Mexico. We look forward to the opportunity to exchange ideas and expertise over the coming years as we work towards achieving our goals of integrated resource management and sustainability not only here in Canada but in other parts of the world.

Sincerely,

Donald Laishley



Chairman

Robert W. Udell



President

Sponsoring Partners



Weldwood of Canada Limited
Hinton Division



Overview

The Foothills Forest is one of a number of Model Forests which make up Canada's Model Forest Network. The network is funded under Canada's Green Plan for a Healthy Environment, Partners in Sustainable Development of Forests Program.

The Partners in Sustainable Development of Forests Program has been 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 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. This approach will achieve local, national and international recognition"*.

The sponsoring partners are committed to achieving this mission by incorporating values such as conservation, cooperation and integrated resource management into the Foothills Forest program.



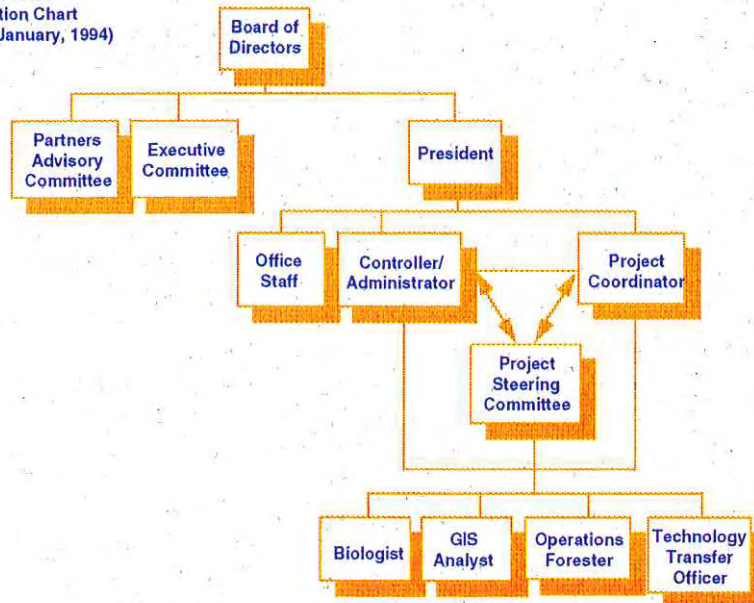
CANADA'S GREEN PLAN
LE PLAN VERT DU CANADA

The Foothills Forest organizational structure has changed as a result of the Business Planning process undertaken in 1993/94.

The Board of Directors has overall responsibility for the Foothills Forest project. The Board is comprised of 10 members with representation from the three sponsoring partners; Alberta's Department of Environmental Protection, Weldwood of Canada Limited (Hinton Division), and the Alberta Forest Technology School, as well as from Parks Canada (Jasper National Park). Two additional members are elected to serve on the Board from the over 70 partner groups and organizations involved in the Foothills Forest project.

The newly formed Executive Committee is comprised of local representatives from the

Foothills Forest
Organization Chart
(revised January, 1994)



Board of Directors who represent the sponsoring partner organizations. This Committee is responsible to the Board and meets regularly as required 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 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 Forest project. The Project Steering Committee, with representation from Weldwood, the Forest Technology School, Alberta's Land and Forest Services and Fish and Wildlife Divisions, 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 Forest are delivered by a full-time operations forester, biologist, GIS analyst, and communications and technology transfer officer. Research opportunities have also been created for 7 graduate students from University of Alberta and the University of Calgary.

Jasper National Park has devoted one full-time position to Park related projects.

Foothills Forest Officers and Board of Directors

Chairman of the Board

Don Laishley
Forest Resource Manager
Weldwood of Canada Limited (Hinton Division)

President

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

Treasurer

Bill Craig
Divisional Comptroller
Weldwood of Canada Limited (Hinton Division)

Secretary

Marsha Spearin
Administrative Coordinator
Weldwood of Canada Limited (Hinton Division)

Dr. Jim Beck
Professor, Forest Management
University of Alberta

Mr. Frank Cardinal
Director, East Slopes Region
Fish and Wildlife Division

Mr. Colin Edey
Senior Environmental Planner
Nova Corporation

Mr. Bill Fairless
Superintendent, Edson Forest
Land and Forest Services Division

Mr. Gaby Fortin
Superintendent, Jasper National Park
Parks Canada

Mr. Cliff Henderson
Director, Forest Management Division
Land and Forest Services Division

Mr. Dennis Quintilio
Director
Forest Technology School

Ex-officio Member

Bob Newstead
Model Forest Coordinator
Canadian Forest Service

Information, Research and Knowledge

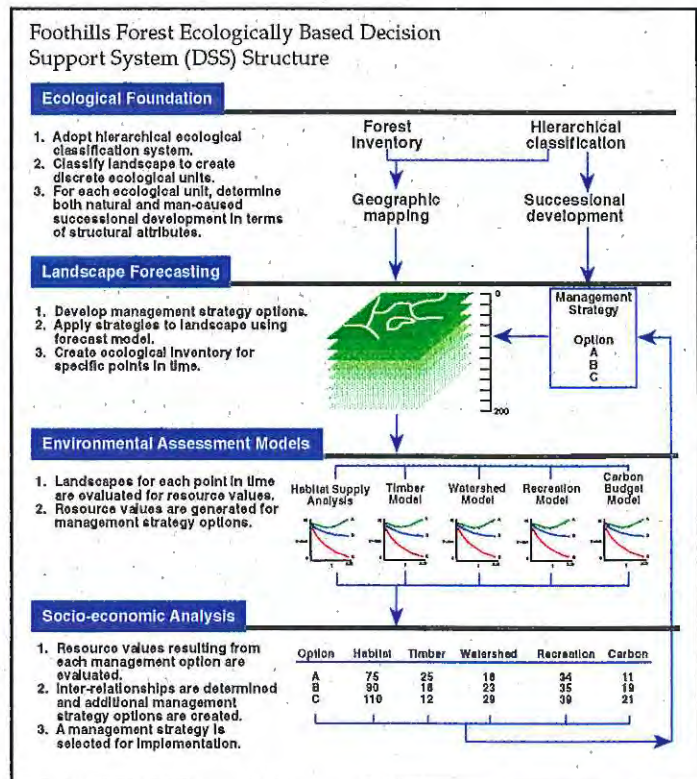
Development of the Foothills Forest Ecologically Based Decision Support System (DSS) is the cornerstone of much of the work now being carried out in the Foothills Model Forest.

"The Foothills Forest DSS is 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 decisions. Erdle and Wang (1992) identify four key components of a 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 Forest DSS embodies these four components in four segments: Ecological Foundation, Landscape Forecasting, Environmental Assessment Models and Socio-economic Analysis". (Currie, Lougheed, and Presslee, 1994).

A number of projects are well underway towards the development of the Foothills Forest DSS.

Geographic Information Systems

The start of the 1993/94 fiscal year proved to be costly for the Foothills Forest as fire swept through the Weldwood Forest Operations Office complex in May of 1993. Our GIS workstation, color electrostatic plotter and



associated software and data files were lost in the blaze. The ensuing months were spent in finding and replacing equipment, restoring data and finding alternate office space. The operational GIS configuration is now back up to speed and work on the Foothills Forest data model is progressing as planned.

Digital Forest Inventory

Work on this activity was completed in 93/94 and included digitally scanning provincial Phase III forest inventory maps and then tying all associated attribute data to the scanned information. All attribute data was edited and corrected to ensure consistency. A consultant was then hired to edge match all of the digital inventory data and to create a one-to-one spatial attribute database. In addition, all compartment boundaries were checked and tied to the standard 1:20,000 scale base map data. This activity, when added to Weldwood's existing forest cover data, has provided us with almost complete digital coverage for the entire 1.2 million hectares covered by the Foothills Forest.

Blocking/Landscape Forecasting Models

This two-phase project first involves the development of a "blocking" model to help simulate future forest harvesting operations. The model creates individual cutblocks over the landscape by applying various harvest design criteria and limitations (ie. size, shape, species composition, adjacency constraints, stream buffers, slope limitations, etc.). A block schedule is then developed and included in the simulation model for use in developing inventory "snapshots" for the various other assessment models.

A beta or test version of the blocking model was completed in 1993/94 by Dr. Glen Jordan and graduate students at the University of New Brunswick. The beta version is capable of creating cutblocks resembling those created by Weldwood's operational practices. Minor revisions are planned to take place in conjunction with the forest level projection models development in 1994/95.

Ecosystem Classification of Permanent Sample Plots

Work commenced on a literature review focusing on various mensurational relationships and ecological variables and how these can be used to better classify the over 6,000 permanent sample plots that exist within the Foothills Forest.

Evaluation of the ArcForest Data Model

The enormous amount of information that will be used by the Foothills Forest DSS requires us to have a very clear understanding of the data requirements necessary for effective resource management decision making. It also requires the development of a database that is efficient, flexible, and adaptive to ensure that all necessary data are available to

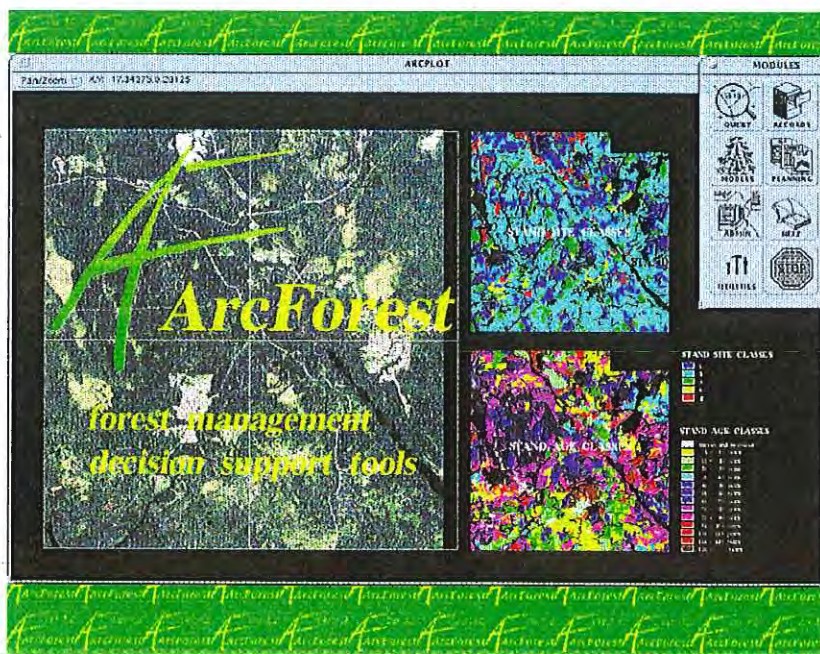
meet DSS module requirements.

The Foothills Forest commenced work on two separate fronts in 93/94 with respect to data model development. A test release of ESRI's ArcForest™ v1.2 was received in April, 1993 for evaluation but was not fully reviewed before it was destroyed in the May fire.

A separate data-scope was initiated by the Foothills Forest GIS analyst to determine what types of data were needed and which were currently available.

Further evaluation of the ArcForest™ model was carried out after the GIS section was brought back up to full speed in the fall of 1993. At that time it was decided to purchase ArcForest™ and to adapt it to fit the specific needs of the Foothills Forest.

Our own logical data model and detailed data model have now been completed and the joint development of a Foothills Forest/ArcForest™ data model commenced in March, 1994.



Lichen Regeneration Study

Large-scale forestry operations have an impact upon the forest communities in which they occur with different components affected to varying degrees.

The role of lichens in forest dynamics is not completely understood and, for the most part, has been overlooked. The close relationship demonstrated in a number of stud-



ies between lichen abundance and Woodland Caribou populations may also be directly relevant to the preservation of endemic caribou populations.

The effects of commercial forestry practices may, through direct and indirect factors, have the potential for producing a wide range of impacts on the lichen component of forest communities. The Foothills Forest, in conjunction with a graduate student from the University of Alberta, has embarked on a lichen regeneration study. The study will review how various harvest and silviculture treatments affect the pattern of lichen cover and diversity in relation to the original fine-scale pattern of ground-cover and to make recommendations as to the forestry practices most appropriate to lichen recovery and caribou habitat.

A comprehensive literature review of lichen ecology and regeneration has been com-

pleted and field sites selected for the 1994 field season. Preliminary sampling has also been completed in blocks scheduled for harvest in the summer of 1994.

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

Widespread forest management has the potential to reduce the degree of genetic diversity in forest stands, possibly impairing their potential to adapt to future environmental conditions.

While concern has been expressed over this issue on a number of fronts, there is insufficient information available to address whether or not current management practices are having any influence on genetic variation in forest stands.

Dr. Ellen MacDonald and a graduate student from the University of Alberta have initiated a study to determine the effects of forest harvesting and reforestation practices on the genetic variation in lodgepole pine and white spruce, the predominant commercial species within the Foothills Forest. They have completed the development of the required genetic sampling protocol for use during the 1994/95 field season. Preliminary collection of cone and leaf tissues was completed in May of 1993 as well as the identification of seed collection zones in both Weldwood's and Weyerhaeuser's Forest Management Agreement areas.

Integrated Resource Management and Sustainability

"The Foothills 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 statement reflects our ongoing commitment to not only the original ideals of the Model Forest program but the history that preceded the Foothills Forest.

Various research activities and programs have been implemented to address the complex issues of integrating various, sometimes competing, resource uses on a single land base with the intent of maintaining or enhancing the status quo.

Ecologically Based Pre-harvest Planning

Approximately 5,400 hectares of the Foothills Forest's operational landbase was classified

using the current forest ecosystem classification for west-central Alberta (Corns and Annas, 1986). This information was then put into a GIS format for use on an operational scale by Weldwood's forest planning/operations staff with excellent results.

Several additional ecosystems were identified and will be incor-

porated into the larger scale classification program scheduled for 94/95 as well as the planned revision of the classification guide.

Terrestrial Wildlife Habitat Research and Management Strategy

The integration of wildlife needs into the Foothills Forest DSS requires the development of an assessment model that gives resource managers an analysis of wildlife habitat supply (HSA). This analysis is based on the development of a number of single species habitat suitability index models (HSI). These HSI models are intended to provide quantitative predictions of a particular wildlife populations response to changes in habitat caused by some type of impact such as forest harvesting.

Thirty species HSI models, developed in draft form by Weldwood's Integrated Resource Management Steering Committee, form the basis of the Foothills Forest Habitat Supply Analysis. These 30 species were selected for modelling based on their ranking as; 1) an indicator species representing habitat associations; 2) special status species such as rare, threatened, or endangered species, and; 3) emphasis species representing species of socio-economic importance in the region.

Considerable effort was spent over the last year to augment HSI work already being carried out for the Pileated Woodpecker, Elk, and Woodland Caribou. This work resulted in the development of an additional 10 HSI projects that will commence in 1994/95.

Projects selected include:

- spruce-fir dependent passerine bird abundance and distribution
- Northern Flying Squirrels in coniferous forests
- summer habitat use by woodpeckers
- winter habitat use by woodpeckers
- inter-specific owl study
- Barred Owl habitat use and distribution in the boreal forest



- Mule Deer habitat distribution and movements relative to White-tailed Deer
- Neo-tropical migrant passerine abundance and distribution in the boreal forest
- Northern Goshawk predator/prey relationships
- Red Squirrel habitat use

Funding for these new activities will be provided by the Foothills Forest and the Alberta Wildlife Enhancement Trust Fund.

Habitat Supply Models

The intent of the habitat supply model project is to perform a test run of the timber and wildlife components of the Foothills Forest DSS. This two phase activity includes the conversion of an existing stand level timber supply model to a compartment based model to simulate harvesting practices used in the Foothills Forest. This model is now complete and awaits testing and debugging based on a sample land base provided by Weldwood.

Phase two involves the development of a computer-based assessment model which will predict the habitat suitability for many wildlife species of both the current forest landscape and for any future predicted landscape created by the computer based model.

Significant effort was expended in 1993/94 to revisit existing HSI models and to also define new ones (both spatial and non-spatial) and a computer module to estimate the non-spatial aspects of each species of wildlife is now complete. The list of species that are now covered by a wildlife habitat model in various stages of completion includes:

- Savannah Sparrow
- Le Conte's Sparrow
- Clay-colored Sparrow
- Ovenbird
- Golden-crowned Kinglet
- Hermit Thrush
- Varied Thrush
- Ruffed Grouse

- Three-toed Woodpecker
- Hairy Woodpecker
- Pileated Woodpecker
- Hoary Bat
- Red Squirrel
- Red-backed Vole
- American Marten
- Fisher
- White-tailed Deer
- Mule Deer
- Elk
- Moose
- Woodland Caribou
- Black Bear
- Grizzly Bear
- Warbling Vireo
- Great Gray Owl
- Common Yellowthroat
- Chipping Sparrow
- Mink
- Long-toed Salamander
- Trumpeter Swan
- Barred Owl
- Snowshoe Hare
- Boreal Owl
- Flying Squirrel
- Northern Goshawk
- Brown Creeper



Habitat Yield Curves

The development of habitat yield curves is essential to the Foothills Forests Wildlife Habitat Assessment Model.

Yield curves are, simply put, relationships between any measurable forest variable and the age of the forest stand. They provide information about each forest cover type so that forecasts of habitat suitability for various animal species can be made through the use of HSI's now being developed. This procedure will allow the HSA module to assess the impact of a series of disturbances (harvesting, roads, oil and gas activity) on the wildlife populations found throughout the Foothills Forest area.

Yield curves have been used for the prediction of timber volume, height and diameter

classes for many years. The HSI requires additional information for the prediction of plant cover, downed woody debris, shrub height, and other variables related to wildlife species ecology.

Work has progressed on the development of these rudimentary yield curves with the ongoing compilation of a number of required habitat variables from different sources and identification of existing data gaps. The meaning of, units of measure, and required precision of measurement of these habitat variables has also been defined.

Integrating Elk and Timber Management in a Boreal Mixedwood Forest

Elk, an emphasis species selected by the Foothills Forest, represents one of a number of species now being studied to test, validate, and calibrate a HSI model and to integrate that information into a spatial HSA for use in forest resource management.

The seasonal distribution, habitat use and activity patterns of elk in the boreal mixedwood ecosystem will help us to:

- identify important components of elk winter range by comparing elk-selected versus random habitats
- test model variables relative to elk selected habitats
- determine if current model variables are the most significant factors relative to the presence/absence of elk
- calibrate model variables to local geographic conditions, and;
- test the ability of the HSI model to predict elk spatial distribution and habitat use



Six cow elk (four adults and two yearlings) have been trapped, using modified collapsible Clover traps, and radio collared. Poor access and relatively low elk

densities throughout the heavily forested area have made trap location/success difficult.

Ninety telemetry locations were collected over the course of 1993/94. Data analysis will commence in 1994/95 as well as ground truthing of telemetry locations for habitat characterization.

Trapping has again been suspended for the spring calving season to minimize potential stress on pregnant cows but will resume in the summer of 1994.

Woodland Caribou Distribution and Habitat Selection in Disturbed and Undisturbed Winter Range

Reports of Woodland Caribou population declines after timber harvesting in home ranges have been identified but poorly documented to date. The effects of harvest patterns on caribou range for both predator avoidance and maintenance of primary food sources such as lichens must also be considered.

The selected study area for the Foothills Forest caribou study lies outside of its geographic boundaries in Weyerhaeuser's Forest Management Agreement area. This site was chosen based on the 8 years of available data on pre-harvest caribou distribution and habitat selection in the area. A portion of the range has now been logged, providing an excellent opportunity to monitor caribou response to harvesting, changes in distribution, and abundance of alternate prey and predators within the now altered winter range.

A total of 20 caribou (19 females, one male) were captured and collared between October 4 and 15, 1993 and their distribution in disturbed (cutover) and undisturbed winter range was monitored from December 8, 1993 to April 8, 1994.



A total of 252 relocations were obtained over this period. This information was compared to 193 relocations of 17 individuals (11 females, 6 males)

obtained between 1980 and 1992, a period before and during logging activity.

The results suggest avoidance of cutover areas (disturbed) and natural clearings (undisturbed) during the winter of 1993/94. The significant snow depths (>80cm) during the winter of 93/94 are thought to have contributed to the observed distribution. Based on these preliminary observations, timber harvest has the potential to significantly alter woodland caribou habitat use in west-central Alberta; particularly in deep snow winters. How this apparent reduction in habitat use affects the population dynamics of this species will be a question which will be addressed by future work.

A Masters student has been backtracking from the weekly GPS locations since January in order to provide information on habitat use at a micro scale. This information will be combined with the landscape level analysis to develop a HSI model for west central Alberta.

Pileated Woodpecker Study

The Pileated Woodpecker was chosen as one of the species for HSI modelling for the Foothills Forest DSS because of its role as a management indicator species for some forests in the United States as well as Weldwood's Forest Management Agreement area.

Little is known about Pileated Woodpecker habitat ecology in boreal forest ecosystems and much of the published information on

the species comes from the United States, particularly the Pacific Northwest.

Two male birds were captured and fitted with radio transmitters in the spring of 1993. The birds adjusted well to the transmitter packages and approximately 400 telemetry locations and observations were obtained before both birds were killed by avian predators, presumably northern goshawks.

First year results have helped to substantiate our concern that most existing information is not applicable to the Foothills Forest region. Demonstrated habitat use is not comparable to reported information from other forest ecosystems and the existing U.S. Fish and Wildlife Service HSI model has already proven invalid in this particular area.

In addition to telemetry and observation data, information was collected on indirect habitat use as well as habitat

selection at four different scales (landscape, stand, habitat element and microsite) and a protocol has been developed and tested to identify and measure habitat variables for scale-dependent analysis.

Information obtained in the first capture season has helped to revise the 1994 trapping schedule and methodology and it is hoped that a much larger population will be fitted with transmitters in 1994.



Mammal Inventories

A total of 36 kilometres of snow-track surveys were carried out in 1993/94 to determine the seasonal distribution and habitat use of a variety of mammal species across various forest types in the Foothills Forest.

The preliminary snow-tracking methodology was analyzed with regards to its cost and efficiency and is currently being expanded for an intensive 1994/95 sampling effort.

Planning for a small mammal trapping program got underway in 1993/94 with the hope of implementation in upcoming years. Wildlife observation cards were also developed with the hope of enhancing the animal distribution database. These cards will be distributed to a wide array of forest users in 1994/95. The information gathered will provide either core or supporting data for the testing of HSI models developed for fisher, mink, moose, showshoe hare, and southern redback vole.

The Effect of Horse Grazing on Forest Regeneration

Horse grazing on areas managed primarily for timber production has and will continue to be a contentious issue in many areas of Alberta.

Estimates of the number of horses running in the Hinton area vary from 200-800. A significant number of these horses graze (for at least part of the year) in active logging areas where company's are required to carry out legislated reforestation work. This has resulted in a number of regeneration failures being directly blamed on horse grazing.

Historical grazing rights have run headlong into legislated land tenure resulting in little dialogue and significant amounts of conflict. For this reason, the Foothills Forest is investigating horse grazing behaviour to determine if it indeed poses a significant threat to forest

regeneration.

A graduate student from the University of Alberta has carried out extensive preliminary observation of horse grazing in cutblocks with confirmed winter use. Areas have been located and mapped and seedlings exposed in foraging craters have been tagged.

Investigation of summer use will begin in 1994 as well as an assessment of damage caused by winter foraging.

Watershed Assessment Model Development

The Foothills Forest area is ribboned by an estimated 3300 km of streams and rivers, many of which support populations of four key fish species including rainbow trout (native Athabasca River strain), bull trout, Arctic grayling, and mountain whitefish.

As well, the importance of Alberta's eastern slopes from a watershed/hydrologic perspective is reflected in, "A Policy for Resource Management of the Eastern Slopes", 1984.

The Foothills Forest expended considerable effort in 1993/94 to reach concensus on both the type of research that was necessary for watershed and the scope of research in light of available financial and human re-



sources. This effort was culminated by a domain expert workshop at the Forest Technology School in Hinton on January 10-12, 1994. The resulting report, "Proceedings of a Workshop for Development of a Strategic Plan for a Watershed Assessment Model (WAM)", has helped to focus the Foothills Forest's efforts. Work on the watershed assessment model will commence in 1994/95.

Bull Trout Spawning and Rearing Evaluation

Bull Trout is one of only four trout species native to Alberta. Although once the most widespread and perhaps most abundant trout species in the province, it is generally accepted that the distribution and numbers of Bull Trout have declined dramatically in the last 40-50 years with populations now confined to streams, lakes and rivers along the eastern slopes of the province.

The Foothills Forest provided funding to Trout Unlimited Canada, a partner organization of the Foothills Forest, to help expand on one of their research projects in Fisheries Management Unit #4, designed to identify Bull Trout spawning and rearing areas in the McLeod, Wildhay, Berland and Muskeg drainages. A final project report will be released in the summer of 1994.

Validation of Basal Diameter Ratio Competition Index for Pine-Aspen

Performance expectations for juvenile conifers have been incorporated into the province of Alberta's free-to-grow regeneration standards. This has resulted in the implementation of extensive conifer release programs to bring regenerated stands to the provincially targeted standards. To date, most treatment decisions have been generally subjective or arbitrary based on lack of available biological information or financial resources.

The focus of this study is to field test a competition index for quantifying the level of

aspen competition that best predicts lodgepole pine growth and to develop tending prescriptions based on that information.

Field reconnaissance was completed in the summer of 1993 with all baseline information gathered, plots established and aspen removed by mid-September.

Data analysis is presently underway with an establishment report expected by the summer of 1994.



Silvicultural Impacts of Chipper Residue Disposal

Remote chipping is a forestry practice that is increasing in usage today as it allows for greater utilization of small diameter wood that would have not been economical to harvest in the past.

By putting chipper residue back on the site, the forest manager may reduce or eliminate the need to burn debris, increase amount of organic matter in the soil, and possibly increase the soil moisture holding capacity of the soil, all potential benefits. This practice may, however, create a short-term nitrogen deficiency as available nitrogen is used in the decomposition process thus robbing tree seedlings of an essential nutrient during the critical establishment phase. Chip residue may also act as an insulator, delaying the spring thaw and shortening an already short boreal growing season.

Foothills Forest is studying the effects of chipper residue on the ability of harvested areas to meet both stand and forest level



regeneration objectives (ie. short-term tree establishment and growth, long-term site productivity).

The study area was selected and all baseline data

collected in August of 1993. Detailed soil sampling was completed and analysis is currently taking place. Timber harvesting was completed in January of 1994 with residue distributed back over the block. Scarification will take place in the spring of 1994.

Aspen Regrowth and Competition after Release of Conifers

Very little is known about how the timing, type and height of a release cut affects the density and growth of aspen and how these processes are in turn related and controlled by aspen size and age.

By determining the best timing and cutting techniques for controlling aspen and gaining a better understanding of aspen response to various treatment regimes, Foothills Forest hopes to develop more effective and efficient tending prescriptions for lodgepole pine stands.

Three trials have been scheduled 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.

Two of the scheduled trials have been completed with site selection for Trial C to be



completed in the spring of 1994. The four required treatments will be completed on this area over the course of 1994.

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

Basal girdling by small mammals is expected to have a significant growth and yield impact in some pine stands that have regenerated after harvesting. This damage is considered to be very different from that which is known to occur in fire-origin stands.

Queries have been carried out on Weldwood's Regenerated Stand Inventory (RSI) database to help identify potential stands that may be affected by girdling damage. Ground truthing of sites has begun in an effort to find representative stands that will be sampled in accordance with a methodology developed by Canadian Forest Service and Foothills Forest staff.

Adapting Shelterwood Practices to Enhance and Protect Natural White Spruce Regeneration in Deciduous/Coniferous Mixedwoods

Almost 90 percent of the Foothills Forest is characterized by pure and mixed conifer stands of pine, spruce and subalpine fir within the Subalpine, Upper Boreal and Lower Boreal Cordilleran Ecoregions. About 10 percent is mixedwood with significant deciduous composition in the Lower Boreal Cordilleran and Boreal Mixedwood Ecoregions.

Dramatic increases in demand for the deciduous component of mixedwood stands, characterized by aspen, poplar and white spruce - commonly as an understory - has coincided with increasing concern about alternatives to clearcutting and the maintenance of relatively diverse stand structure, composition and forest function. These forest types are ecologically suited to harvest sys-

tems other than clearcutting, particularly shelterwood, which can be adapted to assist in the enhancement and protection of natural white spruce regeneration.

The practice of shelterwood silviculture to white spruce management is not new and has been researched and practiced quite successfully in stands with a high coniferous component. The adaptation of shelterwood systems to enhance and protect white spruce regeneration in mixedwoods with a high deciduous component however, is something quite new.



The goal of the Foothills Forest study is to adapt shelterwood silviculture practices to deciduous/coniferous mixedwoods with 60 percent or greater deciduous composition in order to protect and enhance natural white spruce regeneration.

Progress to date includes air and ground reconnaissance to identify an appropriate harvest site with proper species mix and understory characteristics. Preharvest assessments were carried out to determine the exact locations of the understory protection and shelterwood components of the project.

Shelterwood blocks were laid out and harvested in February/March 1994 using hand fallers and line skidders. The understory protection area, including machine corridors and wind buffers, were laid out in October, 1993 and logging was completed in March, 1994 using feller bunchers and grapple skidders.

Silviculture treatments and monitoring of white spruce regeneration, light transmission levels, soil temperature, and height and cover percentage of four primary shrub and herb species will be carried out in 1994 and beyond.

Pre-harvest Treatments of Aspen for Reducing Brushing Expenditures

After the harvest of conifer stands with aspen components, aspen generally regenerates by root suckering and competes with conifer regeneration, often at dramatic levels. For example, 25 to 30 aspen trees/hectare can result in 10,000 to 20,000 stems of aspen/hectare that can severely affect conifer survival and growth.

This study, undertaken with assistance from the Canadian Forest Service, will assess the operational feasibility and biological efficacy of performing various aspen control treatments prior to timber harvest.

Research plots from the initial L'il Beaver mechanical girdling trial conducted by Weldwood in 1990 were established and data collected in August, 1993 prior to the scheduled winter harvest.



Blocks have been selected for the single-tree injection trials and harvest amendments/application permits applied for.

Ecotourism Opportunities in the Foothills Forest

Tourism is a major industry in Alberta, employing 61,000 people and contributing 4.1% to the province's economy in 1988. Many areas have little tourism development and potential markets remain untapped. The West Yellowhead region, close to major centres such as Edmonton and Calgary, is a good example. The area possesses exceptional natural beauty and outstanding geological, geographical, historical and cultural features. A long association with various resource based industries has provided an interesting legacy of growth and ghost towns.

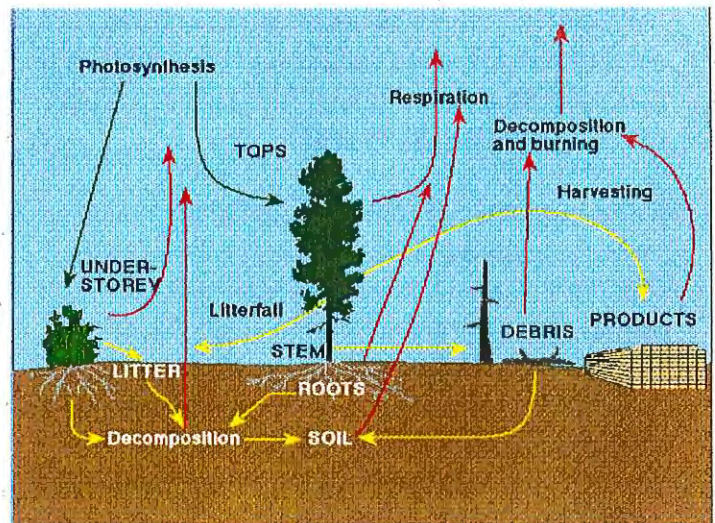
Opportunities exist for year-round outdoor recreational activities of varying intensity and degree of isolation. Consumptive and non-consumptive use of wildlife offers additional possibilities.



A graduate student from the University of Calgary's Faculty of Environmental Design continued work on an ongoing evaluation of the physical, natural, cultural, and recreational resources of the Foothills Forest area. Numerous sites were inventoried and entered into the Foothills GIS for future reference and use. As well, a number of areas were identified for various degrees of promotion and interpretation through either the Foothills Forest, Hinton Chamber of Commerce, or Evergreen Country Tourism Association.

Estimating the Annual Carbon Budget of the Foothills Forest

Recent scientific developments have suggested that the global carbon balance may be very dependent on the existence of a northern terrestrial carbon sink (Tans *et al.* 1990;



D'Arrigo *et al.* 1989). Particular attention has been focused on the circumpolar boreal forests because they are known to be a very large reservoir of carbon (in soils and peatlands). As a custodian of 10% of the world's boreal forests, Canada has a responsibility to ensure that the carbon balance is maintained.

The carbon budget model of the Canadian Forest Sector (CBM-CFS) considers forest growth, soil processes, ecosystem disturbances (including harvesting) and carbon stored in wood products. It then tracks the transfers of carbon among the identifiable carbon pools, from and to the global atmosphere, to derive an estimate of the net gain or loss of carbon by a forested area.

Most of the Foothills Forest area is comprised of Weldwood's Forest Management Agreement area. Weldwood has established an excellent permanent sample plot network which has helped to generate a database from which biomass inventory and growth rates may be determined. It will be possible to generate a significantly more accurate carbon budget assessment at the regional scale than is possible at the national scale, by combining local soil and ecosystem data recently obtained for the area by Parks Canada (Jasper National Park) with

Weldwood's company records of harvesting and wood product sales.

The objective of this study is to modify the carbon budget model so that it can be used to derive an estimate of the current and historical carbon budgets of the Foothills Forest. The final product will be a detailed carbon budget analysis for the Foothills Forest for a single representative year, broken down by land area classifications such as ecosystem types and forest management working circles.

A feasibility study for this project has been completed and data collected from Parks Canada and Weldwood has been organized to fit the Carbon Budget Model format. Much of this work is being carried out by Canadian Forest Service research scientists at the Northern Forestry Centre in Edmonton.

Environmentally Significant Areas Study

The original Foothills Forest proposal included the following goal.

Goal 9

"Conserve forest biodiversity, including genetic, species, ecosystem, spatial and temporal aspects".

Objectives

- 1. Develop an inventory of undisturbed ecosystems, including currently protected areas and other lands.*
- 2. Identify ecosystems that may be suitable and desirable for protection as undisturbed ecosystems.*
- 3. Incorporate undisturbed/protected ecosystem objectives into integrated resource management strategy*

Work towards achieving this goal is being carried out in conjunction with the Foothills Forest, Weldwood of Canada Limited, and Alberta's Department of Environmental Protection (Land and Forest Services and Parks) with funding assistance from the



Ecological Reserves component of the Green Plan.

A draft Environmentally Significant Areas inventory report and map for the Foothills Forest was completed in the 1993 fiscal year and is currently in the process of final editorial changes. A listing of potentially significant sites is included in the report and will provide direction for ground truthing of sites in 1994.

Community Forest White Paper

The idea of a "Community Forest" is not a new one in Canada. S.T. Dana advocated Community Forests in 1918 as a means of re-establishing community control and a sense of pride in the ownership and management of local forests. The issues of today however are much more complex than in 1918.

The Foothills Forest is developing a white paper on the concept of community forests that will look at the many examples of community forestry that exist and examine the issues that surround this form of forest management. Over 200 papers, articles, and case histories have been assembled that document issues and philosophies relating to the creation, development, implementation, and management of community forests in North America.

Communications

The Foothills Forest Business Planning process reinforced the belief that effective communications is vital to the success of our program and our organization. It is our hope that the activities and programs related to the Foothills Forest will convey a message of resource integration and sustainability and that our approach will be consistent, open and honest, and effective.

Development of our Business Plan was followed closely by a revised Communications Plan. This new plan will be used to guide our communications and technology transfer initiatives for the duration of our 5 year mandate.

Activities that were carried out in 1993/94 include:

Public and Partner Newsletters

Production and distribution of a public newsletter on a quarterly basis to over 10,000 homes in the Foothills Forest area continued in 1993/94. The newsletter focused on the various projects, activities, and milestones achieved by the forest over each quarterly reporting period.

The InForM newsletter (short for integrated resource management) is designed to keep our network of partners informed on the current status of projects and is distributed to a mailing list of over 100 partner groups, organizations and individuals across Canada.

Tours

The Foothills Forest hosted a large number of tours over the past year involving groups from as far away as Germany, Japan, Russia, Mexico and China. Tours focused on a variety of research areas, forest practices and various aspects of integrated forest manage-

ment. The demand for tours and presentations of this nature created sufficient demand to warrant the hiring of a seasonal tour coordinator for the coming summer.

NAIT Student Training Exercise

The Northern Institute of Technology (NAIT) students attending the Forest Technology School for the second year of the Forest Technician program had an opportunity to act as instructors over the past year.



Students from Harry Collinge High School were taken out to the Cache Percotte Forest just south of Hinton to learn first hand from future forest managers about the various forest management practices in use today. Part of each group's lesson included a discussion on the Model Forest Program being implemented by Natural Resources Canada and the significance of having the Foothills Forest in their own community.

Geographic Information Systems Technology Transfer

The 10 station GIS training lab located in the Forest Technology School filled a number of roles in 1993/94.

It served as a training facility for various GIS-based courses for Foothills Forest, Weldwood, Land and Forest Services, Fish



and Wildlife, and industry staff. It also helped to serve as Weldwood's temporary office and operational GIS facility for a two and a half month period after the May fire destroyed their office and equipment.

A variety of demonstrations and lectures were also given to visiting delegations from Mexico, Russia, Japan, China, and other various industrial, educational, and non-governmental organizations throughout the year.



Foothills Forest Involvement with the Chihuahua Model Forest

In the fall of 1993, the Foothills Forest was approached by the Canadian Forest Service and the Department of External Affairs to submit a proposal for administering one of two proposed international model forests in Mexico.

Our proposal to administer the Chihuahua Model Forest, located in the west-central part of the state of Chihuahua along the Western Sierra Madre Range, was accepted and a



formal contribution agreement between the Chihuahua Model Forest and the Department of External Affairs and International Trade was signed on February 15, 1994.

Foothills Forest staff then began work with the proponents of the Forest to assist them with the development of their three year work plans, administrative procedures, and overall project planning.

The overall mission of the Chihuahua Model Forest is: *"integrating people with sustainable environmental management practices"*.

The objectives that they have established include;

1. *To restore environmental balance in the landscape and the communities.*
2. *To stimulate economic activity to improve people's lives and reduce pressure on the forest.*
3. *To encourage environmental awareness and education.*

Projects included in the Chihuahua Model Forest's work plan include:

- ecotourism development
- forestry extension and information
- pollution control
- tree nursery development
- GIS development
- fish culture development
- agricultural development
- improved silvicultural practices
- preservation and enhancement of the Chihuahua spruce



ARTHUR ANDERSEN & CO.

AUDITORS' REPORT

To the Board of Directors of
Foothills Forest:

We have audited the balance sheets of the Canadian Forest Service Fund and the Contribution Fund of Foothills Forest (a non-profit company incorporated in Alberta) as at March 31, 1994 and the statements of receipts, expenditures and fund balance for the year then ended. These financial statements are the responsibility of the management of Foothills Forest. Our responsibility is to express an opinion on these financial statements based on our audit.

We conducted our audit in accordance with generally accepted auditing standards. Those standards require that we 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 our opinion, these financial statements present fairly, in all material aspects, the financial position of the Funds as at March 31, 1994 and the results of their operations for the year then ended in accordance with the accounting policies described in Note 2 to these financial statements.

Arthur Andersen & Co.

Vancouver, British Columbia
August 12, 1994.

**Foothills Forest
1993/94 Financial Statements**

**Canadian Forest Service Fund
Balance Sheet**

(as at March 31, 1994)

Current Assets		Liabilities	
Cash	\$94	Accounts Payable	<u>\$1,138</u>
Prepaid Expenses	107,448	Fund Balance	<u>152,228</u>
Due from Contribution Fund	45,824		
Total Assets	<u>\$153,366</u>	Total Liabilities and Fund Balance	<u>\$153,366</u>

**Canadian Forest Service Fund
Statement of Receipts, Expenditures, and Fund Balance**

(for the year ended March 31, 1994)

Receipts		
Government of Canada		\$670,000
Expenditures		
Information, Research and Knowledge		422,472
Integrated Resource Management and Sustainability		172,440
Communications		109,109
Finance and Administration		104,552
Other		54,359
Total Expenses		862,932
Excess of Expenditures over Receipts		(192,932)
Fund Balance, Beginning of Year		<u>345,160</u>
Fund Balance, End of Year		<u>\$152,228</u>

**Contribution Fund
Balance Sheet**
(as at March 31, 1994)

Current Assets		Liabilities	
Cash	\$124,588	Accounts Payable	\$11,104
Accounts Receivable	31,625	Due to Canadian Forest Service Fund	45,824
Inventory	394	Other	<u>1,692</u>
			<u>58,620</u>
		Fund Balance	<u>97,987</u>
Total Assets	<u>\$156,607</u>	Total Liabilities and Fund Balance	<u>\$156,607</u>

Contribution Fund

Statement of Receipts, Expenditures and Fund Balance

(for the year ended March 31, 1994)

	Receipts	Expenditures	Fund Balance
General	\$60,996	\$6,587	\$54,409
Protected Areas Permanent Sample Plots Study	15,000	15,449	(449)
Total General	<u>\$75,996</u>	<u>\$22,036</u>	<u>\$53,960</u>
Integrated Resource Management			
Ecological Reserves Proposal	\$22,000	\$15,051	\$6,949
Bird Inventory	10,000	7,000	3,000
Lichen Study	17,054	17,054	0
Elk Study	1,189	722	467
Pileated Woodpecker Study	39,423	35,132	4,291
Total Integrated Resource Management	<u>\$89,666</u>	<u>\$74,959</u>	<u>\$14,707</u>
Resource Information and Planning Systems			
GIS Technology Transfer	\$40,249	\$29,538	\$10,711
Extend and Upgrade Digital Inventory	7,734	7,734	0
Habitat Supply Module	15,500	3,000	12,500
Total Resource Information and Planning Systems	<u>\$63,483</u>	<u>\$40,272</u>	<u>\$23,211</u>
Technology Transfer, Public Awareness and Education			
Interactive Systems	\$1,800	\$1,358	\$442
Fire Behaviour Projects	11,150	5,483	5,667
Total Technology Transfer, Public Awareness and Education	<u>\$12,950</u>	<u>\$6,841</u>	<u>\$6,109</u>
TOTAL	<u>\$242,095</u>	<u>\$144,108</u>	<u>\$97,987</u>

Foothills Forest
Notes to Financial Statements
March 31, 1994

1. OPERATIONS

Foothills Forest was incorporated in Alberta on November 2, 1992 as a non-profit company under Part 9 of the Companies Act of Alberta. It is a joint venture between Weldwood of Canada Limited (Hinton Division) and the Alberta Department of Forestry, Lands and Wildlife (now Environmental Protection) formed to perform research on sustainable development and integrated management of forest resources through conservation and cooperation. The Foothills Forest comprises 1, 218,014 hectares of forest in west-central Alberta, adjoining Jasper National Park.

Foothill Forest is comprised of two funds; 1) the Canadian Forest Service Fund; and 2) the Contribution Fund. The Canadian Forest Service Fund is set up for the general funding and expenditures of the Foothills Forest. The Contribution Fund is project-specific with funding specifically identified for project expenditures.

The Foothills Forest project is funded mainly by the Government of Canada (Canadian Forest Service), under an agreement that expires in March of 1997, with the remaining funding coming in the form of cash and in-kind donations from sponsors and partners.

2. ACCOUNTING POLICIES

- a) Government receipts are recorded on the cash basis. All other receipts and all expenditures are recorded on the accrual basis.
- b) Non-cash contributions made during the period have not been recorded as part of the financial statements.

3. COMPARATIVE FIGURES

Comparative figures for Foothills Forest are not shown here as prior year results were for a five month period from November 2, 1992 to March 31, 1993.

Foothills Forest

Summary of In-Kind Support (for the period ending March 31, 1994)

(unaudited)

Source:	Information, Research and Knowledge	Integrated Resource Management /Sustainability	Communications and International Program	Finance Administration and Project Coordination	Totals
Province of Alberta					
Forest Technology School	\$9,779	\$1,134	\$19,985	\$18,846	\$49,744
Land and Forest Services	\$3,500		\$2,000	\$65,241	\$70,741
Alberta Fish and Wildlife	\$26,400	\$47,123		\$4,654	\$78,177
Government of Canada					
Canadian Forest Service					
- Canada-Alberta Partnership Agreement in Forestry	\$28,000	\$49,000			\$77,000
- Green Plan - Science and Technology	\$18,750	\$63,000			\$81,750
- CFS A-Base Support	\$41,500	\$15,000			\$56,500
- CFS Associated Support (Note 1)					
External Affairs			\$16,000		\$16,000
Universities					
University of Alberta	\$11,692	\$7,630		\$9,017	\$28,339
Univeristy of New Brunswick	\$1,200				\$1,200
Other Organizations					
Canadian Wildlife Service				\$4,448	\$4,448
Trout Unlimited	\$49,380			\$1,240	\$50,620
Yellowhead School Division			\$300		\$300
Corporate Sponsors					
Arthur Anderson & Co.				\$1,500	\$1,500
Nova Corporation		\$24,387	\$150		\$24,537
Weldwood of Canada Limited (Hinton Division)	\$500,724	\$7,160	\$7,600	\$41,560	\$557,044
Totals	\$690,925	\$214,434	\$46,035	\$146,506	\$1,097,900

Note 1 - In 1993/94, associated CFS research projects of indirect benefit to the Foothills Forest from various funding sources not recorded above amounted to \$60,500

Summary of Cash Contributions (for the period ending March 31, 1994)

(unaudited)

Source:	Information, Research and Knowledge	Integrated Resource Management /Sustainability	Communications and International Program	Finance Administration and Project Coordination	Totals
Province of Alberta					
Forest Technology School	\$7,734				\$7,734
Government of Canada					
Canadian Forest Service					
- Canada-Alberta Partnership Agreement in Forestry		\$39,423			\$39,423
- Green Plan - Science and Technology	\$21,000	\$22,000			\$43,000
Parks Canada					
- Jasper National Park	\$15,000				\$15,000
Goods and Services Tax Rebate				\$50,819	\$50,819
Other Organizations					
Habitat Canada		\$10,000			\$10,000
Hinton Fish and Game Association		\$722			\$722
Corporate Sponsors					
Nova Corporation		\$467			\$467
Weldwood of Canada Limited (Hinton Division)		\$17,054			\$17,054
Foothills Forest (Sales)					
GIS Courses	\$40,249				\$40,249
Fire Behaviour Materials	\$7,450				\$7,450
Promotional Materials	\$1,849				\$1,849
Interest Earnings, etc.	\$8,327				\$8,327
Totals	\$101,609	\$89,666		\$50,819	\$242,094

Foothills Forest Partner Organizations

Alberta Economic Development
Alberta Environmental Protection
Alberta Forest Products Association
Alberta Forest Technologists Association
Alberta Forestry Association
Alberta Newsprint Company
Alberta Registered Professional Foresters Association
Alberta Research Council
Alberta Solicitor General
Alberta Trapper's Association
Bosque Modelo Chihuahua
Canadian Association of Coal Producers
Canadian Association of Petroleum Producers
Canadian Environmental Assessment Research Council
Canadian Environmental Pipeline Association
Canadian Forest Service
Canadian Institute of Forestry
Canadian International Development Agency
Canadian Nature Federation
Canadian Parks and Wilderness Society
Canadian Resources Review
Canadian Society of Environmental Biologists
Canadian Wildlife Federation
Canadian Wildlife Service
Cardinal River Coals Ltd.
City of Edmonton
Crestwood Hotel
ESRI Canada Limited
Employment and Immigration Canada
Energy Resources Conservation Board
Evergreen Tourist Association
Finning Ltd.
Fisheries and Oceans Canada
Forest Engineering Research Institute of Canada
Fox Creek Development Association
Gregg River Resources Ltd.
Harry Collinge High School
Hinton and District Chamber of Commerce
Hinton Fish and Game Association
Hinton Good Companions
IWA Local 1-207
Industry, Science and Technology Canada
Parks Canada (Jasper National Park)
Jasper School District 30
Koinonia Corporation
Luscar Sterco (1977) Ltd.
Metis Nation of Alberta
Municipal District of Yellowhead
Norcen Energy Resources Ltd.
Northern Alberta Institute of Technology
Northwood Pulp and Timber
Nova Gas Transmission Limited
Pan-Canadian Petroleum Limited
Petro-Canada Inc.
Petroleum Industry Training Services
Quadco Equipment Inc.
Reid, Collins and Associates
Rocky Mountain Elk Foundation
Ron's Outdoor Source For Sports
Sentar Consultants Ltd.
The Alberta Fish and Game Association
The Forestry Corp.
The University of Alberta
Timbco Ltd.
The Town of Edson
The Town of Grande Cache
The Town of Hinton
Trans-Alta Utilities Ltd.
Trout Unlimited Canada
West Yellowhead Community Futures
Wildlife Biology Branch, Alberta Environmental Research Centre
Weyerhaeuser Canada Ltd. (Grande Prairie)
Wildlife Habitat Canada
World Wildlife Fund Canada
Yellowhead Highway Association



Foothills Forest

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FOOTHILLS



MODEL FOREST
NETWORK
RÉSEAU DE
FORÊTS MODÈLES



CANADA'S GREEN PLAN
LE PLAN VERT DU CANADA