

**FOOTHILLS MODEL FOREST  
PROJECT COMPENDIUM  
1996/97 PROJECT YEAR**

April, 1996

This is a publication of the Foothills Model Forest pursuant  
to the Partners in Sustainable Development of Forests program,  
administered and funded by  
Natural Resources Canada, Canadian Forest Service.

**MODEL FOREST NAME:**

Foothills Model Forest

**THEME/SUBJECT:**

Information, Research & Knowledge

**PROJECT TITLE:**

GIS System Administration (Operational)

**KEY WORDS:**

Arc/Info, GIS, DSS, hardware, software

**PROJECT DESCRIPTION:**

Much of the work to be completed by the model forest will require the production of associated maps and the analysis of geographic data. To make this possible, a geographic information system (GIS) must be established for management, analysis and mapping of Foothills Model Forest data. Establishment of a GIS includes purchase of the necessary hardware and software, maintenance of the hardware and software, and system administration.

The purpose of this project is to ensure that the necessary hardware and software is in place to manage the resource information databases necessary to achieve the model forest goals and objectives. Payment of maintenance fees ensures ongoing protection and technical support for all hardware as well as technical support and upgrades for all software.

**DELIVERABLES:**

Installation of GIS hardware and software. Ongoing maintenance of GIS hardware and software.

**COST:**

Model Forest Contribution: \$212,299

Other Contributions: \$45,000 (in-kind)

Total Project Value: \$257,299

**PROJECT LEADER'S NAME:**

William Wolniewicz, Geographic Information Analyst, Foothills Model Forest, (403) 865-2747

**PARTNERS:**

Weldwood of Canada (Hinton Division)

Environmental Systems Research Institute Canada (E.S.R.I. Canada)

**IMPORTANT DATES:**

Hardware maintenance paid until March 31, 1997

Software maintenance paid until February 1997

**MODEL FOREST NAME:**

Foothills Model Forest

**THEME/SUBJECT:**

Information, Research & Knowledge

**PROJECT TITLE:**

GIS System Administration (Technology Transfer)

**KEY WORDS:**

Arc/Info, GIS, hardware, software, training

**PROJECT DESCRIPTION:**

The Foothills Model Forest is placing a heavy emphasis on the development of GIS based tools to aid in the support of resource management decision making. Training opportunities for this type of technology are limited in Alberta, especially in a setting that can not only provide the required hardware and software but real world data and examples of applications. Therefore, development of a GIS training facility through the model forest program would provide a vehicle for both basic GIS technology training and for dissemination of knowledge and applications resulting from other model forest projects.

The purpose of this project is to ensure that the necessary hardware, software, data and available applications are in place to achieve the model forest goals and objectives in the area of GIS technology transfer.

**DELIVERABLES:**

Installation of GIS hardware and software.

Ongoing maintenance of GIS hardware and software (Environmental Training Centre).

Oranization/administration of GIS training (Environmental Training Centre and University of Alberta).

**COST:**

Model Forest Contribution: \$181,857

Other Contributions: \$6,000 (in-kind)

Total Project Value: \$187,857

**PROJECT LEADER'S NAME:**

Rob Thorburn, Environmental Training Centre, Hinton, AB, (403) 865-8216

**PARTNERS:**

Weldwood of Canada (Hinton Division)

Environmental Systems Research Institute Canada (E.S.R.I. Canada)

Environmental Training Centre

University of Alberta

**IMPORTANT DATES:**

Hardware maintenance paid until March 31, 1997

Software maintenance paid until Feburary 1997

**MODEL FOREST NAME:**

Foothills Model Forest

**THEME/SUBJECT:**

Decision Support Systems

**PROJECT TITLE:**

Blocking Model and Landscape Forecasting Model

**KEY WORDS:**

blocking, landscape forecasting, GISFORMAN, DSS

**PROJECT DESCRIPTION:**

Existing wood supply models can be characterized as either non-spatial or spatial. Non-spatial models cannot schedule activities based on geographic location, proximity to features or activities in adjacent stands. These capabilities are provided by spatial models. The primary advantage in using spatial models is the ability to accurately portray the spatial arrangement of forest management and other activities which impact on the status of geographic units (stands). 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.

For the blocking model, a grid-based as opposed to vector-based approach will be taken in forming "geographic units". Grids, it is theorized, will improve the flexibility and precision in forming harvest blocks, for example. The geographic units will be used in management strategy definition, treatment allocation, forecasting and performance evaluation. The geographic precision (resolution) should, in turn, be a basis for improving consistency between strategic and operational planning. The blocking model addresses the "region delineation" research priority identified on page 31 of the Vanguard Report<sup>1</sup>, *"Development of generic region delineation procedures should be considered which accept user-specified criteria (such as size, shape, contents, proximity) and delineate regions that satisfy those criteria. Procedures should be developed to delineate regions before, during and after treatment schedule generation."*

Second, the project proposes to design, program and implement a GIS-based strategic planning system for incorporation into the Foothills Forest DSS. The system will build on spatial modelling concepts and techniques developed in GISFORMAN. The system will be capable of accommodating alternate blocking strategies, involving simulated as well as engineered harvest blocks, for varying forest conditions and projecting forest inventory for assessment of long-term wood and habitat supply. This undertaking, in addition to satisfying specific requirements of the Foothills Model Forest, would also be the vehicle by which the region delineation tool is applied and assessed in an operational setting.

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<sup>1</sup> Vanguard Forest Management Services Limited. 1992. Preliminary analysis of decision support system requirements of Canada's Model Forest Partners. Report prepared for Forestry Canada - Science and Sustainable Development Directorate. iv + 32 pp.

**DELIVERABLES:**

The Forestry Corp., July 1995. Problem Analysis for the Landscape Forecasting Model, Draft Report

GIS based blocking model, January, 96

GIS based landscape forecasting model, December, 96

**COST:**

Model Forest Contribution: \$102,885

Other Contributions: \$128,750

Total Project Value: \$231,635

**PROJECT LEADER'S NAME:**

Hugh Lougheed, Forest Planning Coordinator, Weldwood of Canada Limited, Hinton Division, (403) 865-8191

Dr. Glen Jordan, Department of Forest Resources, UNB, (506) 453-4501

**PARTNERS:**

Weldwood of Canada Limited, Hinton Division

University of New Brunswick, Department of Forest Resources

Western Newfoundland Model Forest

Fundy Model Forest

The Forestry Corp.

**IMPORTANT DATES:**

Program started in late 1993

Completed blocking model, January, 96

Completed landscape forecasting model, December, 96

**MODEL FOREST NAME:**

Foothills Model Forest

**THEME/SUBJECT:**

Forest Ecosystem Classification/Decision Support Systems

**PROJECT TITLE:**

Ecologically Classify Foothills Forest (ELDAR)

**KEY WORDS:**

ELDAR, ecological classification, expert system

**PROJECT DESCRIPTION:**

The Ecological Land Data Acquisition Resource (ELDAR) 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.

ELDAR 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.

The hierarchical classification system used in the original field guide (West Central Guide to Forest Ecosystems) has been modified to incorporate several years of operational use. These changes have to be incorporated into the expert system portion of ELDAR. A major field test is continuing that will be used to modify ELDAR to reflect the new ecological classification process and to prepare a database that is correct for both spatial and attribute records for forest cover and soils.

**DELIVERABLES:**

Revised field guide/database, October, 95

Final report, January, 97

**COST:**

Model Forest Contribution: \$49,000

Other Contributions: \$77,000

Total Project Value: \$126,000

**PROJECT LEADER'S NAME:**

Sean Curry, Inventory Forester, Weldwood of Canada Limited, Hinton Division, (403) 865-8189

**PARTNERS:**

Weldwood of Canada Limited, Hinton Division

Alberta Department of Environmental Protection, Land and Forest Service

Canadian Forest Service, Northern Forestry Centre

Alberta Research Council

**IMPORTANT DATES:**

Project initiated in March, 93

Anticipated completion in late 1996

**MODEL FOREST NAME:**

Foothills Model Forest

**THEME/SUBJECT:**

Information, Research & Knowledge

**PROJECT TITLE:**

Development of Foothills Model Forest Data Model

**KEY WORDS:**

data model, GIS, DSS, data

**PROJECT DESCRIPTION:**

The foundation for any computer based decision support tool must include a well designed data model upon which all applications are built. Such a data model must be an organized and efficient system for data storage and retrieval which provides users with access to the data they need, regardless of application, in a straight forward and timely fashion. The data model must also integrate all types of data to be used within the system and must document the relationships among the data. The detailed design specifications for this data model provides both users and application developers with a type of dictionary and road map describing what the data looks like and how to access it.

The Foothills Forest Business Plan (February 1994) identified a number of data related issues that would help the model forest to be recognized as a leader in the application of information technologies. Included were the needs for credible information, comprehensive inventories, continuing data management, accessible information and data driven recommendations. All of these needs require a sound data foundation in order to be achieved and the Foothills Model Forest Data Model is intended to provide that foundation. Therefore, the purpose of this project is to develop, test and document a data model which will support the Foothills Model Forest Decision Support System (DSS).

**DELIVERABLES:**

Detailed data model including both spatial and attribute data. Detailed Design Specifications document (documentation of the data model).

**COST:**

Model Forest Contribution: \$39,942

Other Contributions: \$16,700 (in-kind)

Total Project Value: \$56,642

**PROJECT LEADER'S NAME:**

Carol Doering, Geographic Information Analyst, Foothills Model Forest, (403) 865-8551

**PARTNERS:**

Weldwood of Canada (Hinton Division)

The Forestry Corp

Land & Forest Services Division, Alberta Department of Environmental Protection

Environmental Systems Research Institute Canada (E.S.R.I. Canada)

**IMPORTANT DATES:**

Data model and documentation to be complete by December 31, 1995.



**MODEL FOREST NAME:**

Foothills Model Forest

**THEME/SUBJECT:**

Information, Research & Knowledge

**PROJECT TITLE:**

Regional Ecological Land Classification

**KEY WORDS:**

ecological land classification

**PROJECT DESCRIPTION:**

The Foothills Model Forest is currently developing a predictive ecological land classification system (ELDAR) in conjunction with Alberta Research Council, Canadian Forest Service and Weldwood of Canada Ltd. This system is operational and is being applied on an on-going basis to the Weldwood Forest Management Area. ELDAR requires soils and forest cover information as well as a digital elevation model (DEM). It uses the revised West-Central Guide (Beckingham *et al*, in prep.) for ecological land classification.

ELDAR will be a predictive tool used for forest management planning and will operate on landbases in the order of 100,000ha (maximum). It may be useful in the future over a larger landbase provided that input requirements (soils, vegetation, slope and aspect information) are met. Currently, ELDAR cannot be used for the expanded area of interest of the Foothills Model Forest including Jasper National Park. It is also not currently possible to apply ELDAR to the broader region encompassed by the proposed Yellowhead Region

Integrated resource management within the Yellowhead Region is currently done on a jurisdictional basis with little collaboration between land use managers. Management objectives are quite different between agencies however there is a move to adopt more of an ecosystem-based approach. This is partially facilitated by the Foothills Model Forest which brings together a number of partners and user groups to address concerns within the area of the model forest and adjacent Jasper National Park. The recent establishment of the Yellowhead Region Working Group further facilitates the expansion of this initiative to an extensive regional landbase which incorporates Jasper National Park and neighbouring jurisdictions in British Columbia and Alberta.

A common ELC for the Yellowhead Region will allow land managers to consider the cumulative effects of regional land use in planning and management. It will also allow individual managers the opportunity to see how management activities within their respective areas relate to neighbouring jurisdictions. A common ELC can also serve as the foundation for joint management initiatives to address common regional issues such as fire management, grizzly bear and caribou management, mountain pine beetle and access concerns.

Development of a common ecological land classification is seen as a priority within the Yellowhead Region and Jasper National Park has agreed to take the lead on attainment of this goal. To date, ecological land classification experts from Parks Canada, Weldwood (Canada) Ltd., Forestry Canada and Alberta have met to assess the feasibility of establishing a common classification. A User Needs Analysis and Scoping Workshop were held in mid-May to define requirements and specifications of a common ELC.

**DELIVERABLES:**

A seamless hierarchical ecological land classification with a map legend and attribute database for the Yellowhead Region.

A digitized ecological land classification created using the ARC/INFO geographical information system with attached attribute database that will properly function on a UNIX mainframe computer.

A separate thematic data layer for hydrography, jurisdictional boundaries, wildlife management units, land use zones and location/boundaries of urbanized areas in the Yellowhead Region, reserves, UTM grid, and Alberta township and range grid.

Metadata summary and documentation of the product development process including list of components, underlying assumptions, etc.

Map atlas which contains examples of regional land use and mapping. This product will be used to solicit interest in and funding for operational scale products.

**COST:**

Model Forest Contribution: \$25,000

Other Contributions: \$193,000 (in-kind and non-confirmed cash)

Total Project Value: \$218,000

**PROJECT LEADER'S NAME:**

George Mercer, Model Forest Liaison Officer, Jasper National Park, (403) 852-6197

**PARTNERS:**

Jasper National Park

Wildwood of Canada (Hinton Division)

Land & Forest Services Division, Alberta Department of Environmental Protection

Various BC Forest companies

Forest Renewal BC

**IMPORTANT DATES:**

All projects delivered by March, 97

**MODEL FOREST NAME:**

Foothills Model Forest

**THEME/SUBJECT:**

Integrated Resource Management

**PROJECT TITLE:**

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

**KEY WORDS:**

lichen, caribou

**PROJECT DESCRIPTION:**

Large-scale forestry operations have an impact upon the forest communities in which they are operating, with different components being differentially affected. The role of lichens in forest dynamics is not completely understood (Ahti, 1983), and their relationship with caribou populations is not known in its entirety, even though lichens rank high in importance in the caribou winter diet (Ahti, 1961; Moser et al, 1979). Past studies in Alaska, Canada (NWT, B.C., AB., Ont., Nfld.), and Finland have shown a close relationship between caribou populations and lichen abundance with forests of specific ecoregions and stages of development (Ahti, 1959; Ahti et al, 1973; Moser et al, 1979 Oksanen & Ahti, 1982). Thus, the maintenance of sufficient lichen cover, especially ground or terrestrial lichens in a managed forest region is directly relevant to the preservation of endemic caribou populations (Ahti & Hepburn, 1967; Bennett et al, 1983; Enns, 1992).

The effects of commercial forestry practices on terrestrial lichens may occur as a result of direct damage to the lichen itself from factors such as large machinery traffic or the skidding of logs across the ground surface (Harris, 1992). Such immediate physical damages are important when considering the short-term impacts of logging on the abundance and health of lichen communities. Indirect affects may also occur through changes in the ground-level microclimatic conditions that result from the opening of the forest canopy (Harris, 1992). Alteration of the microclimate including increased diurnal fluctuations of temperature, light, and wind speed that result in higher levels and longer periods of desiccation to the lichen may be significant to lichen survival and recovery over a longer time scale. Other variables such as stand age, ecoregion, forest type, soil characteristics, and snowpack thickness may also have an influence on the overall impact of harvesting practices on lichen abundance and recovery (Snyder & Woodward, 1992; Thomas & Kiliaan, 1991). Therefore, through both direct and indirect factors, current forestry practices have the potential for producing a wide range of impacts on the terrestrial lichen component of forest communities.

The Foothills Model Forest encompasses montane, boreal, and subalpine forest regions and serves in part as a migration and wintering range for woodland caribou (Anonymous, 1989; Anonymous, 1992; Edmonds & Bloomfield, 1984). With much of the previous knowledge of terrestrial lichen regeneration based on post-fire studies (Snyder, 1987), this region has the possibility of providing important information about the effects of various harvesting techniques on ground lichen abundances and regeneration as well as their impact on indigenous caribou populations (Enns, 1992; Harris, 1992; Snyder & Woodard, 1992).

The purpose of this study is 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. Document the effects of different forestry practices on the above communities and thus make recommendations as to the forestry practices most appropriate to the regeneration of terrestrial lichen and management strategy of caribou habitat (part

of the Foothills Model Forest Integrated Resource Management Strategy).

**DELIVERABLES:**

Final report, April, 96

**COST:**

Model Forest Contribution: \$5,000

Other Contributions: \$69,625

Total Project Value: \$74,625

**PROJECT LEADER'S NAME:**

Kirby Smith, Area Wildlife Biologist, Alberta Department of Environmental Protection, Fish and Wildlife Division, (403) 723-8244

**PARTNERS:**

Weldwood of Canada Limited, Hinton Division

University of Alberta, Department of Biological Sciences

Alberta Department of Environmental Protection, Fish and Wildlife Division

**IMPORTANT DATES:**

Project started in June, 93

Completion slated for April, 96

**MODEL FOREST NAME:**

Foothills Model Forest

**THEME/SUBJECT:**

Biodiversity

**PROJECT TITLE:**

Effects Of Forest Management On Genetic Diversity Of Lodgepole Pine And White Spruce

**KEY WORDS:**

lodgepole pine, white spruce, genetic diversity

**PROJECT DESCRIPTION:**

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. The proposed research will utilize DNA-based molecular techniques to quantify genetic variation in natural and managed populations of lodgepole pine and white spruce. The results will 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.

**DELIVERABLES:**

Final report and recommendations for future forest management, August, 96

**COST:**

Model Forest Contribution: \$40,000

Other Contributions: \$136,050

Total Project Value: \$176,050

**PROJECT LEADER'S NAME:**

Dr. S. Ellen Macdonald, Dept. of Renewable Resources, University of Alberta, (403) 492-3070

**PARTNERS:**

University of Alberta, Department of Renewable Resources

Weldwood of Canada Limited, Hinton Division

Weyerhaeuser Canada Ltd.

Canadian Forest Service, Northern Forestry Centre

NSERC

Alberta Forest Development Research Trust Fund

**IMPORTANT DATES:**

Project started in August, 93

Continuation and extension past March, 97 expected with focus on white spruce

**MODEL FOREST NAME:**

Foothills Model Forest

**THEME/SUBJECT:**

Boreal Forest Raptor Habitat Selection

**PROJECT TITLE:**

Northern Goshawk Habitat Characterization in the Foothills Model Forest

**KEY WORDS:**

northern goshawk, *Accipiter gentilis*, habitat, selection

**PROJECT DESCRIPTION:**

This project is an investigation of habitat selection by northern goshawks (*Accipiter gentilis*) in the boreal forest of Alberta. On the Foothills Model Forest, goshawk nesting habitat will be investigated by sampling the characteristics of the nesting habitat used by the goshawks and contrasting these conditions with the surrounding forest area. Foraging habitat will be investigated by using radiotelemetry to locate foraging birds. Vegetation conditions, and goshawk prey populations will be sampled in the foraging locations. Goshawk prey use will be sampled by observing goshawks feeding their young, and by the collection of goshawk pellets and prey remains.

Investigations that examine the relationships between wildlife populations and their habitat serve as a basis for developing resource management practices that accommodate both forest industry and biological diversity. The information gleaned by this study will be used to revise the preliminary habitat suitability index model that has been developed for the goshawk on the Foothills Model Forest area. The model will be used by resource managers to modify forest management practices to better accommodate timber and wildlife objectives.

**DELIVERABLES:**

Schaffer, W.W., B. Beck, J. Beck, R. Bonar, and L. Hunt. 1995. Northern goshawk (*Accipiter gentilis atricapillus*) year round habitat - draft habitat suitability index (HSI) model. Unpublished report. 14 pp. Final Report: January 1997.

**COST:**

Model Forest Contribution: \$31,000

Other Contributions: \$54,500

Total Project Value: \$85,500

**PROJECT LEADER'S NAME:**

Warren Wesley Schaffer, Department of Renewable Resources, University of Alberta, (403) 434-5805

**PARTNERS:**

Canadian Wildlife Service

**IMPORTANT DATES:**

Project Start in January 1994

Final Report, January 1997

**MODEL FOREST NAME:**

Foothills Model Forest

**THEME/SUBJECT:**

Owl Habitat Use

**PROJECT TITLE:**

Barred Owl Habitat Use and Distribution in the Foothills Model Forest

**KEY WORDS:**

barred owl, mature mixedwood, ecology, radio telemetry, prey, owl abundance

**PROJECT DESCRIPTION:**

A project was initiated in west-central Alberta studying the ecology of barred owls (*Strix varia*). There is very little information existing on the barred owl in Alberta. With the introduction of large forestry companies it was clear that studies on this species, and others, needed to be conducted. The barred owl is of interest because of its possible dependence on mature and old forests. The barred owl has the potential to serve as an indicator of older forests (James 1993). Older forests are characterized by large diameter trees, a multilayered canopy, a high canopy closure, and dead standing and downed woody material. The barred owl was outlined for study by the Foothills Model Forest.

Randomly distributed transect surveys were run from March through May, 1995, to determine the distribution and abundance of all owl species. Barred owl habitat use was determined using radio telemetry and spontaneously calling owls. Nesting, roosting, and foraging habitat is being investigated. Pellets and prey remains will be analyzed to determine the prey the barred owls are taking. Winter track counts and bird point counts will determine the prey available to the barred owls. The project will run for two years.

**DELIVERABLES:**

Takats, D.L. Barred owl habitat use and distribution in the Foothills Model Forest. Progress Report, December 31, 1995. Final Report, January 31, 1997.

**COST:**

Model Forest contribution: \$27,500

Other Contributions: \$67,000

Total project value: \$94,500

**PROJECT LEADER'S NAME:**

Lisa Takats, Graduate student, Renewable Resources, University of Alberta, Edmonton, Alberta.  
(403) 492-2056 or (403) 437-3860

**PARTNERS:**

Alberta Department of Environmental Protection

Weldwood of Canada

Alberta Environmental Training Centre

Jasper National Park

**IMPORTANT DATES:**

Project start date, January 1, 1995

Final report, January 31, 1997

**MODEL FOREST NAME:**

Foothills Model Forest

**THEME/SUBJECT:**

Direct and potential effects of forest practices on salamander populations  
Genetic variation of salamanders

**PROJECT TITLE:**

The long-toed salamander project

**KEY WORDS:**

habitat use, long-toed salamander, forestry practices, genetic variation

**PROJECT DESCRIPTION:**

The long-toed salamander is thought to be vulnerable to habitat alterations (Alberta Fish and Wildlife). In spite of this, little information has been collected on its habitat requirements. An investigation was conducted examining the terrestrial habitat use of this species. In addition, the abundance of salamanders found in clearcuts vs. the adjacent forest and wetlands vs. the adjacent forest was also conducted. The results of this study will provide data on the general habitat requirements and the direct effects of intensive logging on this species. The subspecies found in west central Alberta has been up to some debate. Five subspecies were documented by Ferguson (1961), based on colouration, meristic counts and morphometrics. A examination of allozyme variation from populations across its range will provide additional insight into the genetic makeup and variation of the long-toed salamander. Those populations and the subspecies most similar to the Hinton populations will be determine.

**DELIVERABLES:**

Final results in the form of a final report or thesis, April 1996

**COST:**

Model Forest Contribution: \$25 600

Other Contributions: \$7 600

Total Project Value: \$33 200

**PROJECT LEADER'S NAME:**

Karen Graham, University of Guelph, MSc. candidate

**PARTNERS:**

Weldwood of Canada Ltd. Hinton Division

Environmental Training School

Alberta Fish and Wildlife

Canadian Forest Service

University of Guelph

Biodiversity Challenge Grant, University of Alberta

**IMPORTANT DATES:**

Project Start in April 1994

Final Report, April 1996



**MODEL FOREST NAME:**

Foothills Model Forest

**THEME/SUBJECT:**

Integrated Resource Management

**PROJECT TITLE:**

Summer Habitat Use By Woodpeckers

**KEY WORDS:**

woodpeckers, HSI, nesting, foraging habitat

**PROJECT DESCRIPTION:**

This project will examine the summer nesting and foraging habitat requirements of six woodpecker species that reside in the Foothills Model Forest. The following woodpeckers will be studied: the Three-toed (*Picoides tridactylus*), Hairy (*P. villosus*), Downy (*P. pubescens*) and Black-backed Woodpeckers (*P. arcticus*), the Common Flicker (*Colaptes auratus*), and the Yellow-bellied Sapsucker (*Sphyrapicus varius*).

Woodpeckers are ecologically important in Boreal Forests as they are primary excavators of one or more nest or roost cavities per year. These woodpeckers tend to vacate their cavities after the young fledge and consequently, many holes are created during their lifetime (Bull 1981). These old and unused woodpecker cavities are used by a host of other cavity-using wildlife species (secondary cavity-nesters) that are unable to excavate their own nest cavities (Scott *et al.* 1980). Secondary cavity-nesters utilizing old woodpecker holes include swallows, bluebirds, kestrels, flycatchers and some ducks and owls (Scott *et al.* 1980). Quinlan *et al.* (1990) identified approximately 40 wildlife species that are associated with the habitat typically used by the Three-toed and Hairy woodpeckers. Management of habitat for these two woodpeckers alone would thereby benefit a myriad of other wildlife as well.

In addition to providing nest cavities for a variety of other species, woodpeckers are ecologically important members of the Boreal Forest ecosystem as predators of various wood-boring larvae and ants (Koplin 1968, Conner and Crawford 1974, Kroll and Fleet 1979, Conner 1981). Many of the insects that form the food base for woodpeckers, such as bark beetles are considered pest species (Kroll and Fleet 1979). These insects can potentially cause considerable damage to trees during an outbreak (Kroll and Fleet 1979). Therefore, maintaining habitat for woodpeckers through forest management programs, hence maintaining stable populations, may be an effective form of pest management (Jackman 1975, Kroll and Fleet 1979). Woodpeckers are highly dependent on forest ecosystems for nesting and roosting habitat, as well as for food. Since the majority of the Foothills Model Forest is managed as part of the Weldwood Forest Management Agreement Area, the potential exists for these woodpeckers, and ultimately for many secondary cavity-nesters, to be impacted by forest land management decisions. Forest managers need a tool which will enable them to integrate the needs of wildlife with forest management objectives.

**DELIVERABLES:**

Revised HSI model, June, 96

**COST:**

Model Forest Contribution: \$34,000

Other Contributions: \$16,600

Total Project Value: \$50,600

**PROJECT LEADER'S NAME:**

Rick Bonar, Wildlife Biologist, Weldwood of Canada Limited, Hinton Division, (403) 865-8193

**PARTNERS:**

Weldwood of Canada Limited, Hinton Division

Canadian Wildlife Service

University of Alberta, Department of Renewable Resources

**IMPORTANT DATES:**

**MODEL FOREST NAME:**

Foothills Model Forest

**THEME/SUBJECT:**

Integrated Resource Management

**PROJECT TITLE:**

The Consequences of Habitat for a Forest Generalist

**KEY WORDS:**

Red Squirrel, HSI, populations

**PROJECT DESCRIPTION:**

Central to the study of animal ecology and the understanding of biodiversity is the usage an animal makes of its environment: specifically the kinds of food it consumes and the varieties of habitats it occupies. Few would argue that habitat heterogeneity (landscape patterns), or the non-uniform spatial and temporal distribution of resources, affects species dynamics, abundance and distribution. Such landscape patterns are pervasive in nature and are known, or hypothesized to affect many animal populations and ecological processes. Widely distributed organisms often utilize a variety of habitat types throughout their range. However, a full understanding of the role of habitat heterogeneity requires an examination of demographic processes (movement, survival, reproduction, recruitment) in populations that assemble and become established in multiple habitats. Recent attempts at forest resource management in Alberta have made efforts to include landscape patterns and wildlife populations as a top priority. To understand and conserve biodiversity in animal populations, we need to better understand the consequences of habitat heterogeneity in population dynamics.

It would appear clear that landscape patterns influence the numbers and distribution of many forest rodent species. Intuitively, the occurrence and densities of a given species will be influenced by conditions related to survival and successful reproduction. When referring to generalist species (a single species found in multiple habitat types), there is the assumption that their populations will be more resilient to landscape alterations. I argue that we do not know enough about the interplay between habitat and generalist populations to make this assumption: relatively subtle but important relationships may exist between habitat heterogeneity and populations of generalists. In other words, how does habitat type alter or reinforce the dynamics of a population? By becoming resident in a specific habitat, could the fate of an individual differ from those of animals in other habitats? For example, different habitats may allow for higher reproduction or survival for the same species than other habitats. Altering habitat heterogeneity across a region may have considerable impact on a generalist species in that region. This impact may extend into other species or ecosystem processes if the generalist is a common or important component in the wildlife community.

These concerns are keystone in the current attempts at landscape resource management and the conservation and understanding of biodiversity. The impact of landscape patterns on generalist species has received considerably less attention than that of specialist species considered endangered through anthropomorphic changes to the landscape (eg: loss of old growth). Managers need to understand habitat heterogeneity across the landscape, but they *must* be able to relate this to the animal populations found across the landscape. If we cannot do this, then we are missing a critical component in understanding the biodiversity of an area. This requires population level research across a landscape. Data to address these issues for vertebrate species are uncommon at best. One way we can answer these questions in Alberta is by comparing resident generalist populations in different habitat types in the same geographic location.

Territorial organisms often are used to study the relationship between environment and fitness. Because individuals in territorial populations have exclusive resources, it is easier to draw comparisons between environmental characteristics and individual growth, survival and reproductive success. The North American red squirrel (*Tamiasciurus hudsonicus*) is a forest generalist throughout its range in Alberta. These animals defend individual, non-overlapping territories (exclusive resources) and possession of a territory is critical to survival. That is, members of adult populations are stationary, exhibit resident populations in multiple habitat types and do not move across habitat type. Furthermore, red squirrel populations form an important alternate prey base for secondary consumers such as great horned owls (*Bubo virginianus*), red-tailed hawks (*Buteo jamaicensis*), northern goshawks (*Accipiter gentilis*) and marten (*Martes americana*) among others (eg: Lynx). Given these characteristics, red squirrel populations are fitting for research directed towards generalist populations across habitat types. The study proposed herein directly addresses the demographics of red squirrel populations in three different habitat types in Alberta to better understand the biodiversity inherent *within* a generalist species.

Previous work on red squirrels in Alberta has focussed both on the population and individual level. Historically, population level work has overlooked two important areas. First, populations selected for study in the same geographic area (in Alberta) are commonly in habitat not known to be important for red squirrels (ie: aspen; aspen-black spruce; aspen-balsam poplar) and we know that red squirrel populations are tied to a diversity of *conifer* tree species. Second, where data exists for resident populations in known important habitats (ie: white spruce, pine spp., conifer dominated areas in Alberta, B.C. and Yukon), there is extensive geographic variation between study sites. Hence, problems arise on how to interpret differences or similarities (ie: due to habitat, latitude, adaptations?). This study will compare populations across a habitat continuum from pure white spruce to mixed-wood habitats to pure lodgepole pine, in the *same* geographic location and will focus on the consequences of habitat for a forest generalist.

**DELIVERABLES:**

Revised HSI, February, 96  
Final report, January, 97

**COST:**

Model Forest Contribution: \$27,000  
Other Contributions: \$21,330  
Total Project Value: \$48,330

**PROJECT LEADER'S NAME:**

Dr. Dan Farr, Wildlife Biologist, Foothills Model Forest, (403) 865-8180  
Dr. Stan Boutin, Department of Biological Sciences, University of Alberta, (403) 493-1297

**PARTNERS:**

Alberta Department of Environmental Protection, Wildlife Enhancement Trust Fund  
University of Alberta, Department of Biological Sciences

**IMPORTANT DATES:**

Project initiated in late 1994.

**MODEL FOREST NAME:**

Foothills Model Forest

**THEME/SUBJECT:**

Integrated Resource Management

**PROJECT TITLE:**

Pileated Woodpecker Study

**KEY WORDS:**

Pileated Woodpecker, HSI

**PROJECT DESCRIPTION:**

The pileated woodpecker (*Drocopus pileatus*) is the largest woodpecker in North America. It excavates nest cavities in large trees and forages primarily in dead wood (Bull 1987). A new nest cavity is excavated each year, producing a supply of cavities for larger secondary cavity-using species such as marten (*Martes americanus*). The pileated woodpecker is a major predator of wood-boring forest insects, notably carpenter ants (*Camponotus* spp). Because large trees and dead wood are likely to be less common in managed forests with declining forest age and abundance of dead wood, this species may be negatively affected by intensified forest management (Bull et al. 1992).

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 (Bull et al. 1992). 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 (Bonar et al. 1990), 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 (Schroeder 1982), 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 probably 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.

The purpose of this study is to obtain ecological data on pileated woodpeckers to evaluate and revise the preliminary HSI model for the Foothills Model Forest Decision Support System and to measure pileated woodpecker use of fragmented forests and short-term response to logging. The activity will also develop a habitat management strategy for pileated woodpeckers as part of the Foothills Model Forest Integrated Resource Management Strategy. Implementation of the habitat management strategy will hopefully be through the 1998 Forest Management Plan for the Weldwood FMA.

**DELIVERABLES:**

Revised HSI, June, 96

Final report, January, 97

**COST:**

Model Forest Contribution: \$45,133

Other Contributions: \$213,950

Total Project Value: \$259,083

**PROJECT LEADER'S NAME:**

Rick Bonar, Wildlife Biologist, Weldwood of Canada Limited, Hinton Division, (403) 865-8193

**PARTNERS:**

Weldwood of Canada Limited, Hinton Division

Canadian Wildlife Service

University of Alberta, Department of Renewable Resources

**IMPORTANT DATES:**

Project initiated in 1993

**MODEL FOREST NAME:**

Foothills Model Forest

**THEME/SUBJECT:**

Integrated Resource Management

**PROJECT TITLE:**

Landscape Patterns of Disturbance in the Rocky Mountains and Foothills of Alberta

**KEY WORDS:**

forest fire, disturbance, landscape

**PROJECT DESCRIPTION:**

Forest fires are responsible for much of the natural variability in the Foothills and Rocky Mountain natural regions of Alberta. Fires in these regions may be either stand-replacing or stand-modifying, depending on the intensity and behaviour of the fire, and the fuel conditions of the stand prior to burning. As a result of stand-replacing fires in particular, forests in these regions consist of a constantly changing mosaic of forest age classes. This mosaic can be described spatially using an age class map (time-since-fire map), and expressed non-spatially as an age class distribution or time-since-fire distribution.

Forest harvesting by clearcutting also replaces forest stands with younger stands, and is somewhat analogous to the landscape-scale disturbance caused by fire. (This analogy breaks down at the stand scale because of important differences between fire and logging at this scale.)

Because of the large influence of disturbance processes on biodiversity and ecological processes, management within forest ecosystems to maintain a continued flow of social and economic benefits requires a better understanding of naturally occurring disturbances (e.g., fire) relative to human-caused disturbances (e.g., clearcutting). This understanding is required for a range of spatial and temporal scales. This proposal outlines an approach to quantifying the landscape patterns resulting from historical disturbance by fire in the Foothills Model Forest and Jasper National Park.

This understanding will contribute to the development of regional goals and management objectives. Specifically this work will contribute to the establishment of landscape-level objectives for forest harvesting in Weldwood's forest management area (eg. seral stage representation and distribution by natural subregion) and for vegetation management initiatives in Jasper National Park including prescribed fire and modified fire suppression.

**DELIVERABLES:**

Report summarizing field sampling methodology and assignment of fire years, September 30, 1996.

Final report summarizing analyses, November 30, 1996.

Manuscript for submission to journal, March 31, 1997.

**COST:**

Model Forest Contribution: \$5,000

Other Contributions: \$174,000

Total Project Value: \$179,000

**PROJECT LEADER'S NAME:**

Dan Farr, Biologist, Foothills Model Forest, (403) 865-8180

**PARTNERS:**  
Weldwood of Canada Limited, Hinton Division  
Jasper National Park

**IMPORTANT DATES:**  
Project initiated in 1996



**MODEL FOREST NAME:**

Foothills Model Forest

**THEME/SUBJECT:**

Integrated Resource Management

**PROJECT TITLE:**

Development of a Watershed Assessment Model (WAM)

**KEY WORDS:**

watershed, model, assessment, fisheries, hydrology

**PROJECT DESCRIPTION:**

Foothills Model Forest is developing a Watershed Assessment Model (WAM) as part of its ecologically based Decision Support System (DSS). WAM will provide a common environment for the assessment of the effects of forest management on both terrestrial, aquatic and hydrologic resources. This project is linked to other watershed projects which will supply information (i.e. databases and equations) needed to run WAM. WAM will use GIS and associated databases to access watershed information (fisheries, hydrology, climate, precipitation, soils, stream gradient, aquatic habitat, forest cover, harvesting, growth, and others) and incorporate this into the decision-making process. The stated goal of this project is to have a system capable of evaluating a harvest plan for the resulting cumulative effects of forest management activities on the quantity and quality of water yield from a given watershed or complex of watersheds, and in turn be able to evaluate the impact of the harvest plan on the quantity and quality of aquatic and fisheries habitat. By simulating the outcome of different land management alternatives in time and space, both negative and positive impacts of land disturbances can be identified and incorporated into management decisions. The primary goal of WAM is to assist managers in maintaining the integrity of aquatic ecosystems and associated hydrologic values, as a prerequisite for the support of viable, stable fish populations.

**DELIVERABLES:**

Rothwell, R., J. O'Neil, January 1994, Proceedings of a Workshop to Develop a Strategic Plan for a Watershed Assessment Model (WAM), Hinton, Alberta.  
Foothills Model Forest Concept model completed, March, 95  
Final report and document assessment model, January, 97

**COST:**

Model Forest Contribution: \$75,000  
Other Contributions: \$60,000  
Total Project Value: \$135,000

**PROJECT LEADER'S NAME:**

Janice Traynor, Watershed Coordinator, Foothills Model Forest, (403) 865-5724

**PARTNERS:**

University of Alberta, Department of Renewable Resources  
Alberta Department of Environmental Protection: Surface Water Assessment Branch, Lands and Forest Service, Natural Resource Services

**IMPORTANT DATES:**

**MODEL FOREST NAME:**

Foothills Model Forest

**THEME/SUBJECT:**

Integrated Resource Management

**PROJECT TITLE:**

Regional Hydrology Study

**KEY WORDS:**

hydrology, streamflow, water

**PROJECT DESCRIPTION:**

Streams and associated resources such as fish habitat may be affected by a change in peak flows, low flows, duration of high flows and the timing of discharge. The objective in developing a Regional Hydrology Study for the Foothills Model Forest is to organize and present quantitative information about streamflow amount, timing and variability. Existing hydrometric data for the region (and applicable data from surrounding areas) is used to characterize the hydrology of the region. This information will be used for planning and evaluation of management alternatives. This will also serve as a basis upon which to classify the morphological features of a channel and thus is linked to an evaluation of fish habitat, channel configuration, potential sediment loading etc. Options to obtain estimates of winter streamflow (under ice conditions) will be researched and tested. A recommendation on mechanisms to obtain winter values for planning purposes will be developed. Streamflow monitoring will be initiated on a local watershed.

**DELIVERABLES:**

Regional Hydrology Characterization of the Foothills Model Forest. Consultant report. February 1996.  
Final report March 1997

**COST:**

Model Forest Contribution: \$25,000  
Other Contributions: \$18,000  
Total Project Value: \$43,000

**PROJECT LEADER'S NAME:**

Janice Traynor, Watershed Coordinator, Foothills Model Forest, (403) 865-5724

**PARTNERS:**

Alberta Department of Environmental Protection, Surface Water Assessment Branch  
Land and Forest Services

**IMPORTANT DATES:**

**MODEL FOREST NAME:**

Foothills Model Forest

**THEME/SUBJECT:**

Integrated Resource Management

**PROJECT TITLE:**

Sediment Intrusion of Stream Substrates

**KEY WORDS:**

Sediment intrusion, frozen-core sampling, sedimentation

**PROJECT DESCRIPTION:**

During rainfall and snowmelt, soil disturbance, soil exposure, and soil erosion at road-stream crossings are often the source of increased suspended sediment which can harm fish. The increased suspended sediment is short-lived, and is difficult and expensive to monitor. However, suspended sediment eventually settles into the spaces of the gravel streambed and can cause damage to fish habitat. This sediment intrusion may cause fish mortality by suffocating and blocking-in fish eggs and newly hatched fish, and by disturbing the small invertebrates within the spaces of the streambed's gravel. Sediment intrusion, especially in smaller streams, has more long-lasting effects than suspended sediment, and may be the most important factor for assessing the effects of sediment on aquatic habitats and fish populations.

A survey approach will be used to determine the magnitude of sediment intrusion in small to medium sized foothill streams using the "frozen core" sampling method. This technique takes a sample by inserting a hollow probe into the streambed to a depth of 15 to 30 cm. A cooling agent (dry ice and ethanol) is circulated into the probe, causing the stream substrates in contact with the probe to freeze. The probe is then removed from the stream, and with it a frozen sample 10 to 20cm in diameter. The sample is stored and later analyzed in the laboratory for particle size distribution.

**DELIVERABLES:**

M.Sc. Thesis (UofA Department of Renewable Resources) May 1996  
Final report March, 1997

**COST:**

Model Forest Contribution: \$10,000  
Other Contributions: \$60,000  
Total Project Value: \$70,000

**PROJECT LEADER'S NAME:**

Liane Spillios, Graduate Student, U. of A., Department of Renewable Resources, (403) 492 5814

**PARTNERS:**

University of Alberta, Department of Renewable Resources  
Alberta Department of Environmental Protection, Natural Resources Services

**IMPORTANT DATES:**

**MODEL FOREST NAME:**

Foothills Model Forest

**THEME/SUBJECT:**

Integrated Resource Management

**PROJECT TITLE:**

Fishery and Aquatic Habitat Information

**KEY WORDS:**

fish, aquatic habitat, critical habitat requirements

**PROJECT DESCRIPTION:**

This project's goal is to bring together existing information on habitat requirements of native sportfish found within the FMF, develop an information database as a component of WAM and to identify key habitat parameters that can be used to monitor or predict the impacts of land disturbance on fish.

Historical fisheries information from past inventory, research and consultant reports available for the Foothills Model Forest area was summarized and stored on a computer database. Existing information on critical habitat requirements of the four native sportfish species found within the Foothills Model Forest, Athabasca rainbow trout, Arctic grayling, mountain whitefish and bull trout will be collected and stored in a relational database. Habitat requirements, life-requisite needs, sensitivity to land-use impacts and past research results will be presented. Existing habitat suitability index models will be evaluated for data requirements and possible adaptation and use in Foothills Model Forest. This information will be used within WAM to evaluate sensitivity to and influences from land use activities such as increased sediment input and deposition in the stream channel (i.e. loss or degradation of high quality feeding/holding habitats, reduced spawning/incubation success, decreased invertebrate production, etc.).

**DELIVERABLES:**

Historical Fisheries Information Database for Foothills Model Forest, September 1995  
Fisheries and Aquatic Habitat Information Database and Consultant Report, March 1996  
Final project report March 1997

**COST:**

Model Forest Contribution: \$30,000  
Other Contributions: \$37,000  
Total Project Value: \$67,000

**PROJECT LEADER'S NAME:**

Janice Traynor, Watershed Coordinator, Foothills Model Forest, (403) 865-5724

**PARTNERS:**

University of Alberta, Department of Renewable Resources  
Alberta Department of Environmental Protection, Surface Water Assessment Branch

**IMPORTANT DATES:**

**MODEL FOREST NAME:**

Foothills Model Forest

**THEME/SUBJECT:**

Integrated Resource Management

**PROJECT TITLE:**

Sedimentation Impacts

**KEY WORDS:**

Sediment, monitoring

**PROJECT DESCRIPTION:**

Sedimentation can have a significant impact within the aquatic ecosystem of Foothills Model Forest. In partnership with the Alberta Water Crossing Committee (AWCC) and Canadian Pipeline Water Crossing Committee (CPWCC) a number of joint initiatives are underway or in planning. Membership on the Committees includes Canadian Association of Petroleum Producers, Alberta Environmental Protection (Water Resources and Fish and Wildlife), Department of Fisheries and Oceans and individual oil/gas companies. The purpose of the Alberta Water Crossing Committee is to develop a research program on the effects of sediment on fish and fish habitat. The CPWCC has identified that better regional information is required on fisheries and watercourses.

Information on sedimentation will assist in evaluating impacts on aquatic habitats and developing mitigation measures. Objectives of this program include: 1. Bring together existing information on sedimentation in Alberta to provide a data base to assist in the evaluation of alternative management activities and develop planning tools. 2. To assess existing sediment transport models for applicability and use in Alberta. To develop a conceptual model in the context of ecosystem stress and HADD (Harmful Alteration, Degradation and Destruction) of fisheries habitat. Conduct field research in areas identified to improve predictive capability and understanding of the process of sedimentation.

**DELIVERABLES:**

**COST:**

Model Forest Contribution: \$15,000

Other Contributions: \$95,000

Total Project Value: \$110,000

**FOOTHILLS MODEL FOREST CONTACT:**

Janice Traynor, Watershed Coordinator, Foothills Model Forest, (403) 865-5724

**PARTNERS:**

Nova Corporation

Alberta Water Crossing Committee (Multiple Partners)

**IMPORTANT DATES:**

**MODEL FOREST NAME:**

Foothills Model Forest

**THEME/SUBJECT:**

Improved Forest Practices

**PROJECT TITLE:**

Validation of Basal Diameter Ratio Competition Index for Pine-Aspen

**KEY WORDS:**

basal diameter ratio, stand tending, regeneration, lodgepole pine, aspen, competition

**PROJECT DESCRIPTION:**

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. Current treatment decisions are generally subjective or arbitrary and foresters require quantitative tools to assist in these decisions.

The Canadian Forest Service has completed a project on lodgepole pine (*Pinus contorta*) - aspen (*populus tremuloides*) 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 (Navratil and MacIsaac, 1993) which is a simplification of Lorimer's (1983) competition index:

$$CI = \frac{\text{tallest aspen basal diameter}}{\text{lodgepole pine basal diameter}} \quad \text{Basal Diameter Ratio (BDR)}$$

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.

**DELIVERABLES:**

MacIsaac, D. A., May 1995, Validation of Basal Diameter Ratio Competition Index for Lodgepole Pine-Aspen, Establishment and Progress Report.

Progress Report: March 1996

Final Report: March 1997

**COST:**

Model Forest Contribution: \$25 000

Other Contribution: \$47 500

Total Project Value: \$72 500

**PROJECT LEADER'S NAME:**

Dan MacIsaac, Forestry Officer, Canadian Forest Service, (403) 435-7332

**PARTNERS:**

Canadian Forest Service, Northern Forest Service

Weldwood of Canada Limited, Hinton Division

**IMPORTANT DATES:**

Project started in July, 1993  
Final Report due March, 1997

**MODEL FOREST NAME:**

Foothills Model Forest

**THEME/SUBJECT:**

Improved Forest Practices

**PROJECT TITLE:**

Silvicultural Impacts of Chipper Residue Disposal

**KEY WORDS:**

chipping, remote chipping, site productivity, lodgepole pine, nutrients, soil,

**PROJECT DESCRIPTION:**

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

This project will assess the effects of chipper residue on the ability of cutblocks to meet stand and forest level regeneration objectives. The project will also seek to quantify the distribution patterns of operational disposal practices.

**DELIVERABLES:**

Final Report: March 1997

**COST:**

Model Forest Contribution: \$40,860

Other Contribution: \$171,000

Total Project Value: \$211,860

**PROJECT LEADER'S NAME:**

Dr. Doug Maynard, Soil Research Scientist, Canadian Forest Service (403) 435-7309

**PARTNERS:**

Canadian Forest Service, Northern Forestry Centre  
Weldwood of Canada Limited, Hinton Division

**IMPORTANT DATES:**

Project Started in June 1993

Final Report due March 1997

**MODEL FOREST NAME:**

Foothills Model Forest

**THEME/SUBJECT:**

Improved Forest Practices

**PROJECT TITLE:**

Aspen Regrowth and Competition After Release of Conifers

**KEY WORDS:**

aspen, lodgepole pine, stand tending, release cutting, response, development

**PROJECT DESCRIPTION:**

Aspen (*Populus tremuloides*) regrowth (by suckering from roots, root collar and reshooting from the stems) after release (from stand tending) often necessitates repeated treatments and may negate tending investments. Very little is known of 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.

The purpose of this study is to improve and secure benefits from tending/release treatments in mixed juvenile stands. It will be determined what the best timing and cutting technique would reduce aspen regrowth and competition after release; simultaneously to improve the understanding of vegetative processes of cut juvenile aspen. The end results will be the formulation of tending prescriptions for lodgepole pine.

**DELIVERABLES:**

Final Report: March, 1997

**COST:**

Model Forest Contribution: \$48,300

Other Contribution: \$59,000

Total Project Value: \$107,300

**PROJECT LEADER'S NAME:**

Dr. Stan Navratil, Silviculture Research Scientist, Canadian Forest Service, (403) 435-7336

**PARTNERS:**

Canadian Forest Service, Northern Forestry Centre

Weldwood of Canada Ltd, Hinton Division

**IMPORTANT DATES:**

Project Started in May 1992

Final Report due March 1997



**MODEL FOREST NAME:**

Foothills Model Forest

**THEME/SUBJECT:**

Stand Productivity

**PROJECT TITLE:**

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

**KEY WORDS:**

growth and yield, lodgepole pine, rodent browsing, pine mortality, regeneration

**PROJECT DESCRIPTION:**

Basal girdling by small mammals is expected to have a significant growth and yield impact in some lodgepole pine (*Pinus contorta*) stands regenerated after clearcutting. The problem is particularly evident on pole-size regeneration (15-35 years old), in certain geographic areas where severe browsing occurs. This browsing is generally occurring on the largest diameter trees. Both the damage and impact is cumulative over time. The average age and diameter of crop trees appears to be decreasing in these stands, over time, as the largest crop trees are repeatedly browsed. This reduces their vigour until sub-dominants, if available, take over. The cycle may even continue.

The purpose of the study is to evaluate growth and yield losses in pole-sized lodgepole pine regeneration, due to basal girdling by small mammals. Stem analysis techniques will be used on different sites and stand densities.

The goal of this study is to obtain appropriate data for making recommendations regarding risk in tending programs. Results may aid the decision-making process as to how to avoid stand structures that promote damage, or how to tend stands where damage is occurring (ie. pre-commercial thinning, speciality tending, or stand liquidation in severely affected areas).

**DELIVERABLES:**

Final Report: March 1996

**COST:**

Model Forest Contribution: \$29 000

Other Contribution: \$10 000

Total Project Value: \$39 000

**PROJECT LEADER'S NAME:**

Dr. Imre Bella, Research Scientist, Stand Productivity, Canadian Forest Service, Northern Forestry Centre.

**PARTNERS:**

Canadian Forest Service, Northern Forest Service

Weldwood of Canada Limited, Hinton Division

**IMPORTANT DATES:**

Project started in March 1994

Final Report due December 1995

**MODEL FOREST NAME:**

Foothills Model Forest

**THEME/SUBJECT:**

Improved Forest Practices

**PROJECT TITLE:**

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

**KEY WORDS:**

Shelterwood, mixedwood, aspen, white spruce, regeneration, site preparation, biodiversity

**PROJECT DESCRIPTION:**

Recent dramatic increases in demand for the deciduous component of mixedwood stands, characterized by aspen (*Populus tremuloides*), poplar (*Populus balsamifera*) and white spruce (*Picea glauca*) - 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 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. Such an approach addresses the well-known problem of maintaining the coniferous component within boreal mixedwoods throughout Canada. They tend to revert to deciduous stands when clearcut, making reintroduction of coniferous species like spruce costly and risky. The maintenance of conifers in the mixedwood is important from wildlife and aesthetics as well as timber production perspectives.

The application of shelterwood silviculture to white spruce management is not new in Western Canada. It has historically been researched and practiced most successfully in stands with a high coniferous content, prior to the introduction of modern mechanized harvesting equipment. However 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, is new, and merits both research and demonstration in support of innovative mixedwood management strategies with application within and well beyond the Foothills Forest.

The primary goal of this project is to adapt shelterwood silvicultural practices to deciduous/coniferous mixedwoods, composed of 60% or more deciduous species, in order to enhance natural white spruce regeneration. This project will provide data and demonstrations relevant to current mixedwood management issues including harvesting, site preparation and tending treatments which favor natural regeneration, alternatives to clearcutting for spruce, which is one of the few species in the Foothills Forest ecologically suited to alternative systems, and maintenance of biodiversity in forest structure, function and composition.

**DELIVERABLES:**

Final Reports: March 1997

**COST:**

Model Forest Contribution: \$151,330

Other Contribution: \$94,500

Total Project Value: \$245,830

**PROJECT LEADER'S NAME:**

Dr. Vic Lieffers, Professor, Forest Science Department, University of Alberta (403) 492-4323

Dr. Stan Navratil, Silviculture Research Scientist, Canadian Forest Service, Northern Forestry  
Centre (403) 435-7336

**PARTNERS:**

Canadian Forest Service, Northern Forest Service  
University of Alberta  
Weldwood of Canada Limited, Hinton Division

**IMPORTANT DATES:**

Project started in November 1992  
Final Reports due March 1997

**MODEL FOREST NAME:**

Foothills Model Forest

**THEME/SUBJECT:**

Improved Forest Practices

**PROJECT TITLE:**

Pre-harvest Treatments of Aspen for Reducing Brushing Expenditures

**KEY WORDS:**

aspen, single tree injection, girdling, herbicide, response, development

**PROJECT DESCRIPTION:**

After the cutting of conifer stands with aspen components, aspen (*Populus tremuloides*) regenerates by root suckering and competes with young conifers. Expensive brushing or other treatments are required to maximize and secure softwood production. For example, 25-30 aspen trees/ha can result in 10 000 - 20 000 suckers/ha that severely affect conifer survival and growth. Pre-harvest treatments offer economically and environmentally sound ways of controlling aspen competition and reducing expensive tending treatments.

The purpose is to assess the operational feasibility, biological efficacy and cost/benefits of pre-harvest treatments of aspen. Two methods of treatments will be investigated and compared: manual-mechanical girdling and single-tree herbicide injections.

**DELIVERABLES:**

None expected

**COST:**

Model Forest Contribution: \$15 130

Other Contribution: \$45 000

Total Project Value: \$60 130

**PROJECT LEADER'S NAME:**

Dr. Stan Navratil, Silviculture Research Scientist, Canadian Forest Service, (403) 435-7336

**PARTNERS:**

Canadian Forest Service, Northern Forestry Centre  
Weldwood of Canada Ltd, Hinton Division

**IMPORTANT DATES:**

Project Started in May 1993

Herbicide portion of project postponed March 1994

Project cancelled December 1995

**MODEL FOREST NAME:**

Foothills Model Forest

**THEME/SUBJECT:**

Integrated Resource Management

**PROJECT TITLE:**

Winter habitat selection by elk in a boreal mixedwood ecosystem

**KEY WORDS:**

elk, HSI, HSA, habitat

**PROJECT DESCRIPTION:**

The Foothills Model Forest is now actively involved in research into and development of a Habitat Supply Analysis (HSA) for terrestrial wildlife which will be incorporated into the overall Foothills Forest management DSS at the assessment model level. This endeavour is based on a foundation of HSA research initiated over the past five years by the Integrated Resource Management Steering Committee (IRMSC) of Weldwood of Canada, Hinton Division. Current Foothills Forest activities focus on the development, testing, calibration, and validation of species-specific Habitat Suitability Index (HSI) Models. HSI models provide a calculated value (0 to 1) for habitats based on the selection and measurement of habitat variables which best describe critical life requisites of a species. The Weldwood IRMSC selected 30 individual species representing 16 habitat associations for which HSI models were developed based on either pre-existing models from other geographic areas, expert opinion, or a combination of both (Bonar *et al.* 1990). The Foothills Model Forest is taking these individual HSI models, testing and calibrating the variables within them, and integrating them into an overall HSA.

Elk (*Cervus elaphus*) have 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; 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.

**DELIVERABLES:**

Integration into Decision Support System, June, 96  
Final report, January, 97

**COST:**

Model Forest Contribution: \$120,900  
Other Contributions: \$34,825  
Total Project Value: \$155,725

**PROJECT LEADER'S NAME:**

Rick Bonar, Wildlife Biologist, Weldwood of Canada Limited, Hinton Division, (403) 865-8193  
Kirby Smith, Area Wildlife Biologist, Alberta Fish and Wildlife Division, (403) 723-8244

**PARTNERS:**

Alberta Department of Environmental Protection, Fish and Wildlife Division  
Weldwood of Canada Limited, Hinton Division  
Rocky Mountain Elk Foundation  
Nova Corporation  
Hinton Fish and Gun Club

**IMPORTANT DATES:**

Project started in March, 93  
Anticipated completion in late 1996

**MODEL FOREST NAME:**

Foothills Model Forest

**THEME/SUBJECT:**

Integrated Resource Management

**PROJECT TITLE:**

Ecosystem Response to Disturbance at the Stand Scale in the Rocky Mountains and Foothills of Alberta

**KEY WORDS:**

forest fire, disturbance, stand, structure

**PROJECT DESCRIPTION:**

In the Rocky Mountain foothills, forest fire is the dominant form of disturbance affecting ecosystem composition, structure and function at a range of spatial scales. Management approaches that attempt to balance wood production with other resource values need to incorporate an understanding of the role of natural disturbance, especially if a goal of forest management is to replace fire with logging as the primary disturbance agent. The ecological risks associated with this approach may be directly proportional to the degree to which disturbance by logging differs from disturbance by fire. In other words, a low-risk approach to conserving biodiversity and ecosystem processes while recovering wood fibre may be to implement harvesting practices that resemble the effects of fire as much as possible.

The effects of fire on forest stand structure, and on wildlife species that depend on particular stand structures, are not well documented. This study will describe the effects of forest fire in a sample of recently (since 1955) burned areas in the Foothills Model Forest. Field samples of standing live and dead trees, down woody material, and small mammal populations will be combined with information on pre-burn stand conditions. These results will be compared to samples obtained in logged areas.

**DELIVERABLES:**

Annual Report to FMF (March 1996)  
Final Report to FMF / FRIP (December 1996)  
Manuscript for submission to a journal (March 1997)

**COST:**

Model Forest Contribution: \$76,200  
Other Contributions: \$36,740  
Total Project Value: \$112,940

**PROJECT LEADER'S NAME:**

Dan Farr, Biologist, Foothills Model Forest, (403) 865-8180  
George Mercer, Model Forest Liaison Officer, Parks Canada, Jasper National Park, (403) 852-6197  
Chris Spytz, Biologist, Weldwood of Canada Limited, Hinton Division, (403) 865-6624

**PARTNERS:**

Jasper National Park  
Weldwood of Canada Limited, Hinton Division

**IMPORTANT DATES:**

Project started in March, 93

Anticipated completion in late 1996

**MODEL FOREST NAME:**

Foothills Model Forest

**THEME/SUBJECT:**

Integrated Resource Management

**PROJECT TITLE:**

Woodland Caribou Distribution and Habitat Selection in Disturbed (cut over) and Undisturbed Winter Range

**KEY WORDS:**

woodland caribou, habitat, timber harvest

**PROJECT DESCRIPTION:**

Historical and recent reports of woodland caribou (*Rangifer tarandus caribou*) population declines following timber harvest of their range have been identified but poorly documented (Bergerud 1974, Edmonds 1991, Cumming 1992, Hristienko 1985). Across Canada, wildlife and forest managers have faced conflict with trying to integrate caribou habitat needs with timber harvest (Racey *et al.* 1991, Stevenson *et al.* 1991, Cumming 1992). Recent work in Newfoundland demonstrated that clear-cutting mature forests on summer range may affect the movements and distribution of woodland caribou (Chubbs *et al.* 1993). 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. Studies of caribou in a mixed prey/predator system have shown how caribou use spatial and temporal distribution within their range (away from areas of alternate prey) to minimize or maintain tolerable levels of predation (Bergerud and Elliot 1986, Bergerud and Page 1987, Edmonds and Smith 1991, Seip 1990, Seip 1991). Some jurisdictions, like Ontario, have zoned areas where caribou management will be a priority and timber harvest guidelines are designed for long term maintenance of caribou populations to the detriment of moose and deer populations (Racey *et al.* 1991). Logging scenarios that meet a caribou populations spatial and forage needs are not yet clear i.e. 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. This study has eight years of data on caribou distribution and habitat selection prior to timber harvest. A portion of the range has been logged and there is now an excellent opportunity to monitor caribou response to the harvesting and changes of distribution and abundance of alternate prey and predators within the now altered caribou winter range. The results would be applicable to other winter ranges in west central Alberta and similar situations elsewhere. Resolution of caribou/timber harvest conflicts in the future would be assisted by this monitoring study.

**DELIVERABLES:**

Habitat Suitability Index model for Woodland Caribou, January, 97

**COST:**

Model Forest Contribution: \$125,000

Other Contributions: \$207,550

Total Project Value: \$332,550

**PROJECT LEADER'S NAME:**

Kirby Smith, Habitat Biologist, Alberta Fish & Wildlife Services, (403) 723-8244

**PARTNERS:**

University of Alberta, Department of Renewable Resources  
Alberta Land and Forest Services



Alberta Fish and Wildlife  
International Colin Energy  
Weyerhaeuser Canada Ltd.  
Nova Corporation  
Recreation, Parks and Wildlife Foundation  
Canadian Circumpolar Institute

**IMPORTANT DATES:**

Project started in late 1993

HSI development scheduled for completion in January, 97

GIS analysis and integration, January, 97

**MODEL FOREST NAME:**

Foothills Model Forest

**THEME/SUBJECT:**

Integrated Resource Management

**PROJECT TITLE:**

Ecosystem Monitoring

**KEY WORDS:**

ecosystem, monitoring, function, stand, structure

**PROJECT DESCRIPTION:**

Monitoring of ecosystem composition, structure, and function at a range of spatial scales is an essential component of adaptive management. To date, a comprehensive monitoring program has not been developed for the Foothills Model Forest.

The purpose of this program is to develop the terms of reference for a comprehensive monitoring program for the Foothills Model Forest, including Jasper National Park. The focus will initially be to refine a list of landscape-scale indicators that can be used to monitor ecosystem composition and integrity over long time periods (decades).

**DELIVERABLES:**

The initial products of this program will be twofold. The first will be to assemble a list of existing indicators of ecosystem composition in a report that will also outline the process for obtaining, synthesizing and reporting the status of these indicators at regular intervals. This report will be reviewed and discussed at a workshop to be held in the winter of 1996/97. The objective of this workshop will be to develop the final terms of reference for a monitoring program that could start in 1997.

**COST:**

Model Forest Contribution: \$10,000

Other Contributions: \$10,000

Total Project Value: \$20,000

**PROJECT LEADER'S NAME:**

Dan Farr, Biologist, Foothills Model Forest, (403) 865-8180

George Mercer, Model Forest Liason Officer, Parks Canada, Jasper National Park, (403) 852-6197

Mike Wesbrook, Park Warden, Parks Canada, Jasper National Park, (403) 852-6197

Chris Spytz, Biologist, Weldwood of Canada Limited, Hinton Division, (403) 865-6624

**PARTNERS:**

Jasper National Park

Weldwood of Canada Limited, Hinton Division

**IMPORTANT DATES:**

New project

**MODEL FOREST NAME:**

Foothills Model Forest

**THEME/SUBJECT:**

Integrated Resource Management

**PROJECT TITLE:**

Yellowhead Carnivore Working Group

**KEY WORDS:**

carnivore, conservation, ecology, ecosystem management

**PROJECT DESCRIPTION:**

The Yellowhead Carnivore Working Group is part of the Yellowhead Regional Working Group. It brings together managers from the three jurisdictions in the Yellowhead corridor (BC, Jasper NP, Alberta) to work towards conservation strategies for large carnivores (Pacquet and Hackman 1995). A common approach to the management of large carnivores is beneficial because large carnivore populations span administrative boundaries, and they are sensitive to human activities such as habitat change, creation of access routes, and human-caused mortality. Facilitating this working group is consistent with the mission of the Foothills Model Forest to develop approaches that sustain biodiversity. The regional scale of carnivore populations makes an interjurisdictional working group an effective mechanism.

The purpose of the Yellowhead Carnivore Working Group is currently being defined. The most recent draft (November 30, 1995) is as follows.

To increase our knowledge, and its application, of carnivore populations and their ecology in the Yellowhead region to ensure the long-term conservation of these species, by providing opportunities for all partners to work together in addressing landscape/ecosystem management issues. The species of focus for this group will include: wolf, grizzly bear, black bear, wolverine, cougar, Lynx and bobcat.

The working group objectives are:

1. Compile existing data and information on focus species within the Yellowhead region.
2. Identify management issues and define data and information gaps.
3. Suggest and coordinate research, inventory and monitoring programs on carnivores within the Yellowhead Region.
4. Communicate and promote cooperation with other groups and researchers involved in carnivore programs in the Rocky Mountain region.

**DELIVERABLES:**

The first activity of the working group is to assemble existing information on carnivores in the region. Two projects have been initiated. The first is to assemble a list of the databases available from previous studies on each species, such as habitat use, mortality, and human conflicts. Sources of this information include government, industry, and consultants in the region. The second project is to assemble a bibliography of research and management reports available for each species in the region. The intent of these two projects is to identify information gaps, and direct cooperative research activities to be coordinated by the working group.

**COST:**

Model Forest Contribution: \$5,000

Other Contributions: \$10,000

Total Project Value: \$15,000

**PROJECT LEADER'S NAME:**

Dan Farr, Biologist, Foothills Model Forest, (403) 865-8180

George Mercer, Model Forest Liason Officer, Parks Canada, Jasper National Park, (403) 852-6197

Gordon Stenhouse, Senior Biologist, Weldwood of Canada Limited, Hinton Division, (403) 865-8537

**PARTNERS:**

Jasper National Park

Weldwood of Canada Limited, Hinton Division

**IMPORTANT DATES:**

New project

**MODEL FOREST NAME:**

Foothills Model Forest

**THEME/SUBJECT:**

Integrated Resource Management

**PROJECT TITLE:**

Modeling Soil Compaction, Decomposition, and Tree Growth on Alberta Forest Soils Following Forest Harvesting

**KEY WORDS:**

soil compaction, soil decomposition, model, forest harvesting, forest regeneration

**PROJECT DESCRIPTION:**

The Alberta Environmental Centre initiated this project to model the compaction of Alberta soils from skidder traffic during forest harvesting, the natural rate of soil decomposition, and the effects that soil compaction has on conifer growth. More specifically the study will model: - the changes in soil physical properties resulting from summer logging on moist soil at four levels of skidding activity; - the natural rate that compacted forest soils recover as a function of severity of compaction, soil type, and climate; and - the effect of soil compaction on seedling growth, including the effect on seedlings growing adjacent to areas of contrasting amounts of compacted soil, i. e., seedlings planted in undisturbed soil adjacent to severely compacted skidtrails.

The study is conducted at 14 sites in central and southern Alberta including 4 sites in the Foothills Model Forest territory. Four replicated blocks of treatments, containing 3 levels of skidding traffic (3, 7, and 12 cycles) and an undisturbed control were installed at each site. Soil physical properties were measured immediately after skidding treatment and are remeasured annually to determine changes in soil over time. Seedlings are planted and measured annually in each treatment and at the boundary between skidded treatments and the control to determine growth response. A weather station was installed at each site to monitor climate and soil parameters. Statistical models of soil compaction and decomposition are being developed on the basis of repeated measures analyses of the data with respect to depth and time and using parameters of soil texture, water and organic matter contents as the principal component factors.

**DELIVERABLES:**

- McNabb, D. H. 1995. Effects of soil modifications on soil physical processes, soil quality, and ecosystem health. 32nd Alberta Soil Science Workshop Proc, Mar. 1995, Grande Prairie, 39-58.
- McNabb, D.H. 1995. Changes in soil physical properties resulting from mechanized forest harvesting. XX World Congress, International Union of Forest Research Organizations (IUFRO). Aug. 1995, Tampere, Finland.
- McNabb, D. H. 1995. Effects of soil wetness on the compactibility of soil. Presentation at workshop hosted by Diashowa Marubeni International Ltd. May 1995. Peace River.
- McNabb, D. H., A. Startsev and H. Nguyen. 1996. Compaction of a medium-textured boreal forest soils. (Manuscript to be submitted to Soil Sci. Soc. Amer. J.).
- McNabb, D. H., A. Startsev. 1997. Modeling soil compaction, decomposition, and tree growth on Alberta forest soils following forest harvesting. Final report for Foothills Model Forest, FRIP, and FDRT.
- Startsev, A., D. H. McNabb, Z. Florence, and S. Paquin. 1995. Province-wide study of soil compaction during forest harvesting. 32nd Alberta Soil Science Workshop Proc., Mar. 1995, Grande Prairie, 195-199
- Startsev, A., D. H. McNabb. 1995. Bulk density, air-filled porosity, and infiltration rate of compacted boreal forest soils. Annual Meeting, Soil Science Society of America, St. Louis, Missouri. Oct. 1995.

Startsev, A. 1995. Change in soil physical properties caused by ground-based forest harvesting operations in western Alberta. Seminar. Dept. of Renewable Resources, University of Alberta. Nov. 1995.

Site Summary Reports: A quarterly update of the status of the operational and research activities provided to the customer responsible for each site. June, Aug., Nov. 1995.

**COST:**

Model Forest Contribution: \$62,000

Other Contributions: \$936,240

Total Project Value: \$998,240

**PROJECT LEADER'S NAME:**

Dr. David H. McNabb, Forest Ecosystems Research, Alberta Environmental Centre,  
Environmental  
Protection (403) 632-8264

**PARTNERS:**

Foothills Model Forest  
Forest Research Development Trust  
Canadian Forest Products Ltd.-Alberta Division  
Weyerhaeuser Canada Ltd. - Grande Prairie Division  
Weldwood of Canada Ltd. - Hinton Division  
Millar Western Industries Ltd.  
Alberta Newsprint Company  
Sundance Forest Products Ltd.  
Sunpine Forest Products Ltd.  
Spray Lake Sawmills (1980) Ltd.

**IMPORTANT DATES:**

Experimental design is completed. Equipment development and protocol were completed. First year field work was completed. Processing the first year field samples and data entry were completed. First year soil cores and bulk soil analyses were completed. Second year field work was completed. Processing the second year field samples and data entry were completed. Complete analysis of second year soil cores and bulk soil analyses; and develop model of soil compaction. Complete third year field work. Complete processing the third year field samples and data entry. Complete analysis of second year soil cores and bulk soil; and develop preliminary model of soil decompaction. Plan for continued management and maintenance of research sites.

**MODEL FOREST NAME:**

Foothills Model Forest

**THEME/SUBJECT:**

Integrated Resource Management

**PROJECT TITLE:**

Horse Grazing: Impacts and Strategies

**KEY WORDS:**

horses, damage, competing vegetation, regeneration

**PROJECT DESCRIPTION:**

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. Forest industry representatives have cited cases of extreme horse damage to new regeneration (Ranger 1972). There are conflicting conclusions concerning the cause and effect of horse damage to seedlings. Preliminary studies on seedling damage caused by horses suggest that trampling is the major source of damage while browsing damage appears to be minimal (Salter 1976). Salter (1976) reported 24 % of seedlings exposed in feeding craters made by horses in the snow were damaged, while heavy grazing of horses confined to small plantations during the summer months resulted in no damage. This would seem to indicate that the major period of potential horse damage is during winter feeding activities, and the main cause of direct horse damage is trampling (pawing). There may also be a relationship between horse feeding and subsequent damage to tree seedlings by other agents. Mutual use by horses and elk has been found (Salter and Hudson 1980). Elk were noted as following horses during the winter and feeding in craters created by horses. Mutual use of this type could result in elevated browsing damage to conifer seedlings by elk. It is possible that a similar relationship could exist between horses and rabbits.

There is also potential for horse grazing to have beneficial effects on conifer seedling survival and growth. Herbaceous growth (grasses, sedges, and forbs) on cutblocks can inhibit tree seedling survival and growth (Elliot and White 1987). Herbaceous growth may also have important secondary effects on tree seedling growth. Herbaceous litter insulates the soil, dampening diurnal soil temperature regimes, and slowing spring soil warming. Heavy accumulations of grass litter can delay spring thawing of forest soils by up to one month, and depress soil temperatures throughout the growing season (Hogg and Lieffers 1991). Grazing can ameliorate the negative effects of herbaceous competition and prevent the buildup of dense herbaceous litter mats.

Research into the coordinated use of land for forestry and grazing for Alberta forest types is limited. Most of the historical dialogue has been generated along a single use management pathway. The historical position of the forest industry has been that no grazing is acceptable on regenerating cutblocks. Cutblocks have higher levels of herbaceous production and are very attractive for use as a grazing resource. If the demand for land resources is extreme the result has usually been the exclusion of one use, in favor of another. Historical polarization between forestry and grazing interests has resulted in an environment that is not conducive to true multiple use management.

The overall goal of this study is to determine the effect of horse grazing on conifer seedling survival and growth. Attempts will be made to document both the negative (trampling) and positive (consumption of competing vegetation) effects of horse grazing. Horse grazing behavior under 3 levels of confinement will also be investigated. Grazing behavior is essential for making grazing capacity recommendations.

**DELIVERABLES:**

Final report/thesis, April, 96/March, 97

**COST:**

Model Forest Contribution: \$58,536

Other Contributions: \$58,500

Total Project Value: \$117,036

**PROJECT LEADER'S NAME:**

Barry Irving, University of Alberta, Department of Agriculture, Food and Nutritional Science,  
(403) 492-9738

**PARTNERS:**

Weldwood of Canada Limited, Hinton Division

University of Alberta, Department of Renewable Resources

Local outfitters association

**IMPORTANT DATES:**

Project started in winter, 93

Data collection completed by December, 95



**MODEL FOREST NAME:**

Foothills Model Forest

**THEME/SUBJECT:**

Socio-economics

**PROJECT TITLE:**

A Socio-Economic Research Program for the Foothills Model Forest

**KEY WORDS:**

stakeholders, attitudes, perceptions, socio-economic

**PROJECT DESCRIPTION:**

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 in to 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 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 address' 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 in to 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.

**DELIVERABLES:**

Report series of 6 to 10 reports, from March, 96 to July, 98  
Computer models

**COST:**

Model Forest Contribution: \$222,884

Other Contributions: \$325,000 (approx.)  
Total Project Value: \$547,884

**PROJECT LEADER'S NAME:**

Dr. Tom Beckley, Forest Social Science Research Group, Canadian Forest Service, (403) 435-7372

**PARTNERS:**

Weldwood of Canada Limited, Hinton Division  
Canadian Forest Service  
Nova Gas Transmission  
Jasper National Park

**IMPORTANT DATES:**

Program initiated work in the summer of 1995

**MODEL FOREST NAME:**

Foothills Model Forest

**THEME/SUBJECT:**

Indicators

**PROJECT TITLE:**

Estimating the Annual Carbon Budget of the Foothills Model Forest

**KEY WORDS:**

carbon, carbon budget model, assessment

**PROJECT DESCRIPTION:**

The carbon budget model of the Canadian forest sector (CBM-CFS) of Kurz et al. (1992) 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. Ongoing developments aim at strengthening the reliability of the model by using more accurate input data and improving its internal representations of key processes. To this end, use of the CBM-CFS to generate more detailed carbon budget assessments for smaller forested areas in different parts of Canada will enable the large scale estimates to be validated. This will generate important clues as to where the assumptions and data used to generate these estimates must be revised, if necessary. The Foothills Model Forest will provide an excellent opportunity to test the model in this way.

The purpose of this study is to modify the carbon budget model of the Canadian forestry sector (CBM-CFS), as developed collaboratively by Forestry Canada and ESSA Ltd. (Kurz *et al.* 1992, Apps *et al.* 1991), 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.

**DELIVERABLES:**

Retrospective model runs, June, 96

Final report, October, 96

Projective model runs, November, 96

**COST:**

Model Forest Contribution: \$51,000

Other Contributions: \$138,000

Total Project Value: \$189,000

**PROJECT LEADER'S NAME:**

Dr. Mike Apps/David Price, Canadian Forest Service, (403) 435-7305

**PARTNERS:**

Canadian Forest Service, Northern Forestry Centre

Weldwood of Canada Limited, Hinton Division

Parks Canada, Jasper National Park

ESSA Technologies Ltd.

**IMPORTANT DATES:**

Retrospective model runs, June, 96

Final report, October, 96

Projective model runs, November, 96

**MODEL FOREST NAME:**

Foothills Model Forest

**THEME/SUBJECT:**

Integrated Resource Management

**PROJECT TITLE:**

Yellowhead Regional Working Group

**KEY WORDS:**

regional, resource management, partnerships

**PROJECT DESCRIPTION:**

The Yellowhead Region Working Group is a newly formed organization which includes representatives from government and industry in Alberta and British Columbia. The group was formed in order to better coordinate resource management issues among neighbouring jurisdictions. Foothills Model Forest staff have been key players in the development of the working group and see this work as a logical extension of the Foothills Model Forest program.

The working group currently includes people from industry, Foothills Model Forest, Jasper National Park and both provincial governments. The group has identified nine issues that it would like to work on including information sharing, common data collection and management, caribou conservation, grizzly bear conservation, fire management, access, mountain pine beetle, distribution and representation of habitat types, and the role of disturbance processes.

The Foothills Model Forest Business Plan (1994) identifies several issues and challenges including the need to build partnerships and address strategic data gaps including ecological land classification information.

The recent joining of Jasper National Park to the Foothills Model Forest landbase represents a significant partnership and the potential exists to attract other partners from an area being referred to as the Yellowhead Region, which extends into British Columbia. Parties contacted to date have expressed an interest in collaborating on initiatives to address regional resource management issues and see the Foothills Model Forest as a viable mechanism to move this work ahead. Bringing these partners together under the auspices of the Foothills Model Forest would represent a major achievement in building a regional partnership which transcends not only major ecological boundaries but provincial ones as well. A similar group which brings major resource industry and government partners together to address large scale regional issues does not exist anywhere else in Canada.

**DELIVERABLES:**

- Host the 1997 Yellowhead Region Working Group meeting
- Contribute to the development of Yellowhead Ecosystem Atlas
- Participate in working group meetings (travel/accommodation)
- Contribute to the development of common ecological land classification

**COST:**

Model Forest Contribution: \$10,000  
Total Project Value: \$10,000

**PROJECT LEADER'S NAME:**

Dan Farr, Biologist, Foothills Model Forest, (403) 865-8180

**PARTNERS:**

Weldwood of Canada Limited, Hinton Division  
Parks Canada, Jasper National Park  
Forest Renewal BC  
Various BC Forest Companies

**IMPORTANT DATES:**

Project started in 1995

**MODEL FOREST NAME:**

Foothills Model Forest

**THEME/SUBJECT:**

Communications/Public Awareness

**PROJECT TITLE:**

Open Houses/Community Events

**KEY WORDS:**

Open house, public awareness

**PROJECT DESCRIPTION:**

By inviting the public to the Foothills Model Forest, individuals will have an opportunity to learn about the progress being made. They will also be able to question the intent and results of research and to have some input into the development of future workplans. Questions and criticisms from outside interests help persons involved in Foothills Model Forest to see their own activities from a different perspective and can result in an overall improvement in the quality and direction of the work performed. Plans are being made to take the Foothills Model Forest display and other informative poster on the road to communities in the Model Forest area. Taking the "Open House" on the road will bring the information to the front step of communities, who may otherwise not feel involved in the program. If we can't draw enough interest to gain substantial interest in communities other than Hinton we will probably limit the roadshow to community events/fairs in other towns.

**DELIVERABLES:**

Annual public open house/peer review session (April, 94, 95, 96)  
Remote peer review sessions (Grande Prairie, Peace River, Whitecourt, May, 95)

**COST:**

Model Forest Contribution: \$22,440 (over 5 years)  
Other Contributions: \$  
Total Project Value: \$22,440

**PROJECT LEADER'S NAME:**

Bryan Millar, Communications Officer, Foothills Model Forest, (403) 865-8342

**PARTNERS:**

Weldwood of Canada Limited, Hinton Division  
Researchers involved in Foothills Model Forest projects

**IMPORTANT DATES:**

**MODEL FOREST NAME:**

Foothills Model Forest

**THEME/SUBJECT:**

Communications/Public Awareness

**PROJECT TITLE:**

Newsletter

**KEY WORDS:**

Newsletter, public awareness

**PROJECT DESCRIPTION:**

Public awareness and education are key components of Foothills Model Forest program objectives. In order to effectively participate in forest management decisions, partners and other interested persons must have information and criteria to rate and to judge the acceptability of resource management practices. By providing factual, bias-balanced reports, support for the concept of sustainable forestry will be achieved and local residents and partners will be better able to recognize and utilize opportunities for involvement.

The original intent of the newsletter has been changed from the original mass mailout of approximately 10,000 newsletters on a quarterly basis to local residents within the Foothills Model Forest. The revised newsletter will be mailed to partners and to persons on the mailing list. The mailing list has approximately 400 people at this time, and will expand as requests for information increase. It is expected that the mailing list will continue to grow as the Foothills Model Forest becomes more visible in the community. The new format for the newsletter will be reader-friendly. The intent is to enhance public interest and to provide descriptions of the projects and people involved in studying and managing the resources of the area.

**DELIVERABLES:**

Quarterly newsletter, initiated in 1993

**COST:**

Model Forest Contribution: \$42,470 (over 5 years)

Other Contributions: \$

Total Project Value: \$42,470

**PROJECT LEADER'S NAME:**

Bryan Millar, Communications Officer, Foothills Model Forest, (403) 865-8342

**PARTNERS:**

Alberta Department of Environmental Protection, Environmental Training Centre

**IMPORTANT DATES:**



**MODEL FOREST NAME:**

Foothills Model Forest

**THEME/SUBJECT:**

Communications/Public Awareness

**PROJECT TITLE:**

Technology Transfer/Public Awareness

**KEY WORDS:**

Technology transfer, public awareness

**PROJECT DESCRIPTION:**

Without "change on the ground" the FMF will not have made a difference in natural resources management. To facilitate changes in resource management practices, we need an effective means to transfer our research findings and recommendations. We must transfer our information to government, industry, NGOs and the general public. It is especially important to get our information to resource managers and operators.

Much of our research will be valuable in resource management planning. However, spin-offs will come from the research that can be used by operators and area coordinators. Spin-offs come in the form of inventories, such as the mammal and fisheries inventory. This information can be used by foresters to make decisions during their day-to-day operations.

**DELIVERABLES:**

Fall conference/workshop, 96

Spring conference (co-sponsored), 97

**COST:**

Model Forest Contribution: \$20,000

Other Contributions: \$90,000 (for spring conference from other model forests)

Total Project Value: \$110,000

**PROJECT LEADER'S NAME:**

Bryan Millar, Communications Officer, Foothills Model Forest, (403) 865-8342

**PARTNERS:**

Weldwood of Canada Limited, Hinton Division

Canadian Institute of Forestry, Rocky Mountain Section

Canadian Model Forest Network

**IMPORTANT DATES:**

September, 96

May/June, 97

