

" For all our relations - not only the two legged, but the winged ones, the crawling ones, the four legged, the plants, the trees and those that live in the water. We must look after those that nurture life - the fire, the earth, the water and the air. We must find the balance."

In principle, this is the Manitoba Model Forest. Seeking ways of sustaining a balance in the forest. Seeking ways for people to grow with the forest through sustainable development.

Over one million hectares in size, the Manitoba Model Forest is located 90 minutes by automobile north-east of Winnipeg, Manitoba's provincial capital. A popular recreation destination, the region has over a century of timber harvesting history. For the past seventy years, the region has been the principle supply area for a major newsprint mill.

A non-profit organisation, the Manitoba Model Forest is proudly supported by the Canadian Forest Service. As one of ten model forests across Canada; in international partnership with Mexico, Russia the United States and Malaysia; the Manitoba Model Forest is dedicated to finding new ways to ensure a balance among our economic, environmental and social values.

The Manitoba Model Forest works in partnership with forest stakeholders to research and develop new and innovative ways for people to grow with the forest through sustainable development - for all our relations.

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President's message

The past year was one of accomplishments, achieved as a result of the co-operative efforts of the forest stakeholders involved in the Manitoba Model Forest. It was a year where we recognised the needs of diverse forest users and worked together toward creative, innovative solutions to problems.

The Model Forest program as a whole, has become a model of co-operation between diverse interests of varied stakeholders. We, along with the other members of the Model Forest Network, are quickly becoming an international example of how co-operation between forest stakeholders can lead to better forest practices.

Manitoba is twinned with the Monarch Butterfly Model Forest of Mexico. As Manitoba's President, I had the privilege to represent Manitoba at a meeting with members of that model forest and to see for myself the challenges the Mexican people face in their country. I met with some of the diverse forest stakeholders they must bring together in co-operation in their model forest. Though it seems a formidable task, I believe that with our example and with our experience to draw upon they can achieve ongoing co-operation and consensus. Excellent contacts were made and must be further developed. We will also be able to learn from them and create innovative ideas that will further our progress

We have applied the knowledge we have gained through research on a practical level, with workshops tours and field demonstrations. We have assisted in diversifying the forest practices of the region while increasing environmental awareness. We have used new technologies such as Geographic Information Systems, GIS, and Global Positioning Systems, GPS, to chart the migration of caribou, pinpoint forest resources and broaden the environmental education of students in schools. Most importantly, we have continued to bring stakeholders together in co-operative, meaningful and co-ordinated efforts towards a common goal. Through the continued co-operative effort of the past year we have gained knowledge about the forest and how to work with it.

We have now entered the final year of the model forest agreement between ourselves and the Government of Canada. Model Forest projects, some started five years ago, have now been completed or will soon be finished. Two evaluations on model forest activities are being conducted - one specifically on the Manitoba Model Forest and one on the activities of all model forests in Canada. It appears that both reviews will reflect favourably on our activities.

It would be nice if all those who have participated in our program could sit back, relax and pat themselves on the back for a job well done. That, however, should not be the case. We must now prepare ourselves for another five years - how we can implement the work already completed, how we can get more involved with forest residents, what new work needs to be done? If we can answer these questions and keep participation levels as high as they are currently, there is no doubt in my mind that the Manitoba Model Forest will be in a position to complete another extremely successful five years.

John McQueen,
President

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Organizational Structure

The Manitoba Model Forest was created by a partnership of interested forest stakeholders. Upon acceptance of the original proposal by the Canadian Forest Service, a board was established representing the diverse interests in the forest. There is room at the board for environmentalists, industry, the federal government, local communities, the provincial government, economic development groups, unions, universities, aboriginal organizations and residents.

The Manitoba Model Forest conducts up to 60 different projects a year ranging from research to education. All projects are developed in the working groups and are based on the strategic plan. Projects are usually six months in the approval and planning process. Consultant selection is based on a pre-determined selection criteria and is done by a committee of experts in the project field.

Integrated Resource Management (IRM) Projects

The Manitoba Model Forest, through its IRM working group, is researching new and innovative ways to manage forest resources with consideration for all forest values. Sustaining a balance of forest systems through resource management involves the development of common sense systems for all resource managers. These systems rely on accurate information such as that compiled under the IRM projects.

95-2-07 Experimental Watershed - Year III
95-2-13 Forest Ecology Chair
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 - For our future; co-operative moose management in the Manitoba Model Forest
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95-2-34 Preservation of the American Elm in the Manitoba Model Forest
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95-2-07 Experimental Watershed - Year III

Initiated in 1993-94, this ongoing project is exploring the effects forest harvesting and silvicultural activities have on watersheds within the Manitoba Model Forest. Predicting potential changes in watersheds as a result of forestry activities is an important consideration in the Manitoba Model Forest because of the vast amount of fish habitat, especially spawning beds, found within the region. Changes in water quality will affect habitat and thus have an impact upon the commercial and sport fisheries of the region. In addition to concerns about fish habitat, water quality changes can also have an impact upon the recreational activities in the area. A popular tourist and recreation destination the Manitoba Model Forest has some of the finest beaches in North America within its boundaries, as well as a large number of recreational lakes and waterways often associated with large cottage communities.

The Experimental Watershed project focuses on changes in aquatic habitat as related primarily to runoff, erosion and sedimentation by monitoring a watershed before, during and after logging and reforestation. During the study duration, it measures suspended sediment concentration and sedimentation in aquatic environments, as well as estimating the amount of erosion from a variety of terrestrial sites within the study area.

In the 1995 project year the project measured sedimentation upstream and downstream of crossings in small streams; continued to measure erosion; and installed monitoring equipment at sites shortly after they were prepared for planting.

The terrestrial portion of the study in 1995 primarily focused on areas treated by site preparation. These can best be described as areas where the forest floor had been disturbed more than areas that had only been harvested. This included sample sites which had been shear bladed in winter followed by herbicides in August; sites which were disc trenched in late November; and drag chained in July. Neither shear blading nor herbiciding in August removed the organic layer resulting in negligible erosion detected. In contrast, areas drag chained caused considerable exposure of mineral soils. It should be noted however, that little erosion was detected between site treatment in July and final measurement in October.

With data collection continuing in 1996 final analysis and interpretation of results will not be conducted until the completion of the study in 1996.

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95-2-13 Forest Ecology Chair

The Forest Ecology Chair at the University of Winnipeg was created in 1994 by the Manitoba Model Forest. Since its creation it has been occupied by Geoff Wang. Wang has been conducting research into Forest Ecosystem Dynamics (project 95-2-26). In addition to his research role, Wang is also instructing at the University of Winnipeg. During the past two years he has been instructing the Forest Ecology and the Ecological Methodology courses. A Forestry Field course is currently being planned for addition to the curriculum.

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95-2-16 Moose Co-management - For our future; cooperative moose management in the Manitoba Model Forest

Moose are a highly valued and commonly understood species in the Manitoba Model Forest region. Unfortunately, the moose population has come under a great deal of pressure in recent years due to habitat changes, hunting and poaching. It is generally agreed that the current populations are well beneath the region's capacity and that there is a need to develop a management strategy which involves all stakeholders, especially First Nation communities.

The primary objective of the cooperative moose management project is to develop consensus between stakeholders about what needs to be done to enhance the moose population of the region. This strategy would have to blend traditional needs and beliefs with current rights and other forest stakeholder values. In 1994, this process was developed and a series of workshops undertaken in which interested stakeholders express their needs and beliefs to other stakeholders.

The year end stakeholders meeting, held on March 18 1995, charted a new direction for 1995/96. This new direction involved the establishment of a pilot project area in which a trial management strategy could be developed and applied. It was decided that the Hollow Water First Nation traditional use area in the northern region of the Manitoba Model Forest would be the best site. Hollow Water First Nation is now considering the opportunity.

The pilot region is known locally as Beaver Creek and includes the ' Home Block' which is a community trapline. Prior to being logged and opened for

access, this area had the highest concentration of moose on the East side of Lake Winnipeg.

Improved population and harvest statistics are being compiled for this study and incorporated into the Geographic Information System, GIS, database for the region. Based on this and consultations with stakeholders a moose management strategy is being developed. Like the strategy development process undertaken in 1994, the development and implementation of a management strategy is a complex social and biological undertaking. It will be incorporating the views, beliefs, and needs of First Nation communities, non-government organizations, industry and individuals.

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95-2-17 Forest Birds - year III

This study was initiated to consider how commercial utilization of the boreal forest affects bird populations. An increasing number of studies have reported declines in populations and almost without exception these populations are composed of neotropical migrants; birds which spend summers in the boreal forest and migrate to tropical forests for the winter.

In 1993, a breeding bird survey was designed with the purpose of documenting abundance and distribution of forest birds within the Manitoba Model Forest. This information was gathered to provide some insight into the use of interior forested habitats by birds over time.

The second year of the project focused more on the relationship between regenerating boreal forest stands and existing bird communities. Data collection in 1994 focused on determining the affect on bird populations of fire verses logged regenerating areas.

In 1995, sampling at 243 listening posts or stations continued to build the database of information to be used in final analysis. The listening posts are distributed in a cluster pattern throughout young interior boreal forest habitats in the Manitoba Model Forest. Sampling was performed by experienced observers during the breeding season. Approximately 28% of the sites were also sampled to determine vegetative cover. Including incidental sightings, observers documented 149 species of forest birds during the sampling period. This accounted for over 4900 individuals .

Using a general species scale the largest number of species were observed in harvested jack pine / black spruce stands. A total of 77 species were observed in these areas. It was also noted that harvested jack pine / black spruce were also areas having the largest relative abundance of territorial birds.

The 1995 sampling season was the third year of this four year project . Year III focused on the relationship between boreal forest bird species and the regeneration to pole sapling habitat types. During the 1996 season, researchers will examine the use of riparian habitat types by the bird community and how relationships are affected by logging, fire and urban development. The information compiled by the end of this study could be particularly useful in developing or validating Habitat Suitability Models for individual species and developing sustainable forest management strategies.

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95-2-24 Ecosystem Based Management Framework

Uniting the desires of Manitoba Model Forest partners to "manage" forest resources in an ecologically wise manner and the scientific and philosophical advances in ecosystem based management requires the construction of a framework into which the desires, advances and philosophical ideals can be merged. The goal of the Ecosystem Based Management Framework project is to design an appropriate ecosystem based management framework for the Manitoba Model Forest and its partners. This goal has somewhat different meanings to different partners as the words management and framework can have significantly different meanings to different forest stakeholders. The development of a "framework" has therefore been a long and arduous process.

In 1995 an initial report on ecosystem based management was prepared which explored some of the primary concepts of ecosystem based management and presented a simple framework. This document was used as the basis for subsequent workshops as it provided a common reference from which participants could draw concepts and related information.

The intent of the workshops was to discuss the primary concepts related to ecosystem based management as they apply to the Manitoba Model Forest. From these concepts, participants could then begin building upon the basic framework developed in the initial report. While there are many definitions of ecosystem based management, they all have some common ground. It is this common ground which is being used to build the framework with the combined input of Model forest stakeholders.

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95-2-25 Stakeholder Values

Society is placing more and more emphasis on broadening the range of values considered in forest management. As a result, those responsible for developing forest management plans must now consider all components of the ecosystem and the full range of human values when developing plans. To consider the diverse values and other components, it is necessary to know who the forest stakeholders are; what values they place on the forest; and what role they have in developing forest management plans today and in past years.

The Stakeholder Values project catalogued the stakeholders of the Manitoba Model Forest and presented the rationale for why these groups are considered to be stakeholders. As stakeholder groups were identified the values and interests these groups have in forest management were determined. This process included a review of known studies of stakeholder values conducted previously and a review of methods for determining values.

With stakeholder identification complete the role of stakeholders in determining forest policy was assessed. This review of their planning and policy roles included assessing what their input was in past years as well as what their role is today, and their potential roles in the future.

As in any other forest region, the Manitoba Model Forest has a vast range of actual and potential stakeholders within its region. Each of these stakeholders has diverse and sometimes difficult issues that they can bring to the forest management planning process. For example, industrial users of the forest have millions of dollars invested in forest resource extraction. This results in jobs with their related economic generators. While it has long been believed that this suggests industry has the most legitimate claim to directing forest management policy, it is now being recognized that other stakeholders

such as First Nations and other Aboriginal peoples with their traditional forest uses also have a legitimate role.

Every resident in the province of Manitoba is a legitimate stakeholder in the forest, but their roles, values and influence in forest management policy needs to be defined. How much weight should be ascribed to the various interests? How can forest policy makers manage conflicts between stakeholders? What decision-making framework should be used when consensus between stakeholders cannot be achieved? These are the questions to be faced as we grow towards sustainable development of our forest resources.

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95-2-26 Forest Ecosystem Dynamics

It has long been popularly believed that clear-cut logging mimics the effects of fire. The Forest Ecosystem Dynamics project is studying ecosystem dynamics after fire and harvesting to compare the impacts of these two disturbances on forest ecosystems. By comparing different stages of stand development it may be possible to determine if forests regenerate differently after logging than after fire.

Detailed comparisons of forest stands began in the 1995 field season. Areas being studied include tree regeneration patterns, species composition and diversity, soil processes and seedbanks. For studying forest succession and growth, specifically of black spruce trees, stand age, structure and stem analysis is being performed.

In 1995 25 sites were located reflecting different age classes, harvesting and fire histories. Vegetation descriptions and measurements were conducted on 17 of these sites with soil studies performed on nine. Information collected included current stand information, understory vegetation surveys and moss sampling as well as regeneration information, moss collection and Global Positioning System mapping of study areas.

Based on the data gathered to date, preliminary analysis indicates that some differences in Black spruce regeneration and understory composition exists between the two disturbance types. These preliminary findings lend support to concerns about unsatisfactory regeneration of black spruce on some lowland sites after logging. It has been reported that after fire, black spruce regeneration is generally successful but highly variable after logging.

Whether these preliminary results are significant will be determined after completion of 1996 data gathering and analysis. At that time, analysis of the variability of regeneration will be accessed by linking vegetation data to soil processes and seed bank data.

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95-2-27 Development and Application of Animal Borne GPS Technology on Woodland Caribou

Woodland caribou movements and habitat preferences are of interest to a wide number of Manitoba Model Forest stakeholders. Manitoba Hydro for example, requires information about the woodland caribou for potential use in transmission line site selection, environmental assessment and licensing processes.

The overall purpose of the Development and Application of Animal Borne GPS Technology on Woodland Caribou project is to research caribou behavior and habitat use using animal borne Global Positioning System (GPS) collars. Using the Lotek GPS collars, the project researches woodland caribou activity and movement relative to vegetation associations in the boreal forest environment. It also provides information regarding caribou behavior in relation to sub-transmission line rights-of-way, roads and other linear facilities.

The project establishes and reinforces communications links with other resource oriented organizations and agencies through Manitoba Natural Resources Integrated Resource Management teams and the Integrated Directors Group. This is required by Manitoba Natural Resources so that the effect of Manitoba Hydro's activities on woodland caribou can be kept to a minimum.

One of the many benefits coming from the study is the refinement of the Woodland Caribou Habitat Suitability Index, HSI, models previously developed through the Manitoba Model Forest. This refinement includes the development of summer HSI models and the refinement of winter HSI models. As part of the refinements migration routes, staging areas and other critical sites are being identified.

The development and application of the Lotek GPS collars has been supported by Manitoba Hydro through cooperative funding in association with other major institutions in Canada. The collars are now available for expansion into other application areas such as environmental planning, assessment and auditing.

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95-2-30 Toxicity of Softwood Leachate to Aquatic Organisms

It has been known for decades that the effluent from the mechanical and chemical processing of pulp wood is a potential source of toxic compounds. These compounds, when released into aquatic habitats, can have a detrimental effect on the organisms living in those habitats. Recent studies have shown that another source of toxins may be storage yards where logs are stored prior to the manufacturing process. Hardwood storage yards in British Columbia have recently been shown to be sources of toxins and it has been suggested that softwood storage yards may also contribute toxins into adjacent waterways. The Toxicity of Softwood Leachate to Aquatic Organisms project is addressing concerns raised about softwood log storage yards.

At the request of the Clean Environment Commission, Manitoba Environment was directed to address the question of softwood log yard leachate toxicity. It is known that in softwood mill operations where pine is being used, the predominant toxic compounds are resins and fatty acids. Lignins have been identified as the predominant toxin if spruce is the primary fibre source. New methods of effluent treatment have reduced the effect of mill effluent on the environment. It remains to be proven, however, if softwood logyard leachate contributes these same toxins in significant levels to the environment.

This study is addressing three main questions. First, does softwood leachate exhibit toxicity towards aquatic life and / or soil microbial populations? Second, if the leachate does exhibit toxicity, which substances are responsible for the observed toxicity? Finally, what is the fate of any toxic substances once released into the environment?

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95-2-31 Budworm Management and Biodiversity

Like other provinces Manitoba has been engaged in budworm suppression programs for many years. The overall goal has been to protect forests from being defoliated by budworms. The primary alternative management strategy employed since 1983 involved spraying to control budworm populations with pesticides. The other strategy employed is to use no protection measures and rely on natural controls such as predators and resistance to contain budworm populations.

The Budworm Management and Biodiversity project is examining how the two Budworm management strategies affect subsequent species and ecosystem diversity in white spruce stands. The study examines the responses of three arthropod indicator groups, carob beetles, butterflies and moths to differing levels of budworm infestations and management strategies. Researchers also monitor three vegetation strata, ground cover, shrubs and trees for their responses.

Much of the 1995 field season was concentrated on site selection and moth sampling. Sampling of other arthropods and vegetation begins with the 1996 field season. In total, 13 sites were selected in 1995 with sampling of moth populations at these sites performed from mid-July to late September.

In 1996, efforts will be made to find additional sites, complete preliminary population investigations and categorization of site characteristics.

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95-2-32 Forest Wildlife

To achieve sustainable forestry the integration of wildlife habitat values into forest management planning is a necessity. In 1990, the Manitoba Forestry / Wildlife Management Project initiated a five year cooperative project to address the need for wildlife value input. The project involves a variety of partners including Wildlife Habitat Canada, the Manitoba Department of Natural Resources, Pine Falls Paper Company and Repap.

In 1993 / 94 the Manitoba Forestry / Wildlife Management Project became a project partner on three complimentary Manitoba Model Forest projects. In 1995/96, the Manitoba Model Forest became a full Manitoba Forestry / Wildlife Management Project partner.

The Manitoba Forestry / Wildlife Management Project is targeted at the Boreal Shield and Boreal Plains ecosystems of Manitoba. The goal of the project is to develop a system which quantifies wildlife habitat values for use in forest management planning. It is intended to provide habitat based decision support systems to facilitate integrated forestry / wildlife management planning and decision making.

To achieve this goal, the project developed a process to select wildlife species which could serve as indicator species for the variety of habitats represented in the boreal forest regions of Manitoba. Upon selection of indicator and emphasis species, Habitat Suitability Index models for the species were developed. To ensure accurate forecasting models, the project developed a forest understory database, which is used to enhance existing forest resource inventories. Computer tools are now under development including interfaces between Geographic Information Systems, forest resource inventories and Habitat Suitability Index models. Computer based, the project employs an operational, habitat database capable of working in a variety of spatial scales. It uses habitat suitability models for indicator as well as emphasis species of

wildlife. A communications plan was developed to inform public, industry and government agencies to enhance awareness of integrating timber and wildlife resource values.

In 1995, the central focus was development of habitat suitability indices for the 20 species which had been chosen to represent the diverse habitats of the boreal forest in Manitoba. Model validation was completed for the Barred and the Great Grey owls. The Manitoba Forestry / Wildlife Management Project has begun a validation program based on the Manitoba Model Forest Bird studies (see project 95-2-17). Habitat models to be validated in 1996 include the Black and White warbler, Magnolia Warbler, Red-Breasted Nuthatch and the Ruby Kinglet.

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**95-2-33 Evaluation of Selectively Logged Sites and the Development of an
Experimental Forestry Practice Design within the Manitoba Model Forest
Integrated Forestry / Woodland Caribou Management Area.**

Resource managers require information if they are to develop forestry prescriptions that will maintain the habitat needs of woodland caribou while at the same time satisfying the timber supply needs of industry. The primary objective of this project is to provide that information. This includes information about how past logging has affected the habitat needs of the caribou; what monitoring needs to be performed; and what harvesting and renewal designs will be the most effective to meet the needs of industry and wildlife.

There are strong linkages to other model forest projects. The closest linkage is with the development and application of animal borne GPS technology on woodland caribou in the Manitoba Model Forest. This project supplies information regarding the habitat use of caribou in the research area using GPS collars.

An evaluation of the impacts of harvesting on woodland caribou habitat and woodland caribou use on the areas that were selectively logged during 1982, 1983, and 1984 was conducted. Rates of regeneration, ground vegetation cover and shrub layer composition was evaluated and its value as caribou habitat assessed. This data allowed for an assessment of how past harvesting has impacted habitat supply. In addition, the extent of caribou use of post logged, and pre-experimental cut areas were assessed.

Using data from this assessment, in conjunction with consultation with the Integrated Forestry Caribou Steering Committee, Pine Falls Paper Company and Manitoba Natural Resources, an experimental forestry practice design was developed. In addition, a monitoring program was developed to measure the efficacy of the experimental forestry practice design.

An experimental forestry practice design has to be both practical and achievable in the framework of existing PFPC operations if it is to maintain woodland caribou habitat values in that framework. Building on past efforts and using data collected during this project, it was possible to design a system which included minimization of "edge" and mimic natural processes to enhance the regeneration of overstory species. The use of cut to length FMG harvesting equipment, assessed during the alternative harvesting practices project, will facilitate this.

Long term monitoring of the impacts of the experimental forestry practices design will be needed to assess the success of the project. A commitment has been made to continue monitoring caribou use of harvested areas for a total of five years through the cooperative project involving GPS collared animals. In

addition, vegetation monitoring during the post-harvest time frame has also been made for the next year.

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95-2-34 Preservation of the American Elm in the Manitoba Model Forest

The American Elm, *Ulmus americana* was found throughout the southern half of the Manitoba Model Forest. Since 1975, the population has declined due to the introduction of the fungal infection Dutch Elm Disease. In the decade following the introduction of Dutch Elm Disease to the region approximately 90 % of the indigenous American elm population of the Manitoba Model Forest. The loss of this once common tree species has changed the ecology and successional pathways in many deciduous stands in eastern Manitoba. There are however trees remaining which have shown a resistance to Dutch Elm Disease even 20 years after the initial infection spread through the population.

The purpose of the Preservation of the American Elm project has been to select American elm in Manitoba which have elevated tolerance to Dutch Elm Disease, and through laboratory research, propagate trees with enhanced resistance to Dutch Elm Disease. Recent advances in biotechnology, genetic engineering and other laboratory techniques related to tree propagation has provided background information and techniques for this project.

Plantation sites within the Manitoba Model Forest have now been established for the outplanting of laboratory propagated material. Field testing is scheduled to commence in the 1996 season to test for levels of tolerance to Dutch Elm Disease.

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95-2-35 Flora Database

In order to understand the forest and make management decisions, easily accessible databases are necessary. In a cooperative research agreement with the University of Manitoba, the Manitoba Model Forest is assisting in the establishment of an accessible database of the flora of the Manitoba Model Forest region. This database will be using the University of Manitoba herbarium, database and information accumulated through Manitoba Model Forest project 93-2-6, Inventory and Annotated Checklist of the Manitoba Model Forest. A total of 720 vascular plants have been recorded in the Manitoba Model Forest. This represents 45% of the known provincial flora. The region also contains 50 provincially rare plants and 3 which are considered to be rare nationally.

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Advanced Forest Practices (AFP) Projects

The Advanced Forest Practices working group examines and assesses different forest management practices. Their aim is to develop new and innovative ways to improve those practices. Once new technologies and practices are developed and proven practical and effective, they are transferred to the people who use them, the forest worker.

95-3-01	Impact of Alternative Harvesting Methods in the Manitoba Model Forest
95-3-04	Alternative Vegetation Management Trials
95-3-06	Regeneration of Difficult Sites
95-3-07	Spruce Budworm
95-3-16	Hardwoods on Agricultural Lands
95-3-18	Small Equipment Demonstration
95-3-11	Understory Protection of White Spruce

95-3-01 Impact of Alternative Harvesting Methods in the Manitoba Model Forest

In May of 1993 the Manitoba Model Forest in partnership with the Pine Falls Paper Company, the University of Manitoba and FERIC initiated a four phase project to evaluate alternative harvesting methods. The full tree and the cut-to-length harvesting systems were evaluated.

The overall objective of this project was to find a more "environmentally friendly" harvesting system and determine the level of environmental impact, in such terms as site disturbances, regeneration, wildlife habitat changes and road and land requirements.

The end of the 1995 research year signified the end of the four phase project. Phase one of the study involved the establishment of a pre-harvest botanical baseline. This baseline botanical study was conducted by Drs. I. Waters and J. Shay of the University of Manitoba. It provided reference botanical data for the evaluation of the impact of harvesting on the resident flora.

Phase two focused on the field trials and evaluation of equipment. For the purposes of this study two types of equipment were involved. For the "full tree" harvesting system, the Koehring Feller Buncher was evaluated. For the "cut-to-length" system the FMG system was tested.

Phase three involved post harvest assessment of plant succession and regeneration.

The review of data accumulated in phases one through three lead to the final phase of the project, implementation of the selected equipment system. This implementation involved the development of guidelines and procedures, training of personnel and seasonal trials of the system in the field.

Overall, the FMG cut-to-length harvesting method was the more "environmentally friendly". In terms of habitat values the FMG cut-to length method impacted the least. It should be noted however, that site specific variables can have a significant impact on habitat values as do the habitat needs of specific fauna. Site variability therefore necessitates the need for caution when using the Habitat Suitability Index, HSI, models in planning. This caution is based on the fact that existing HSI models are landscape models designed for use over very large areas and may not accurately reflect site specific conditions. It will be important to re-evaluate all study sites over the course of several years. In that way, habitat impacts, regeneration and

plant succession can be assessed over time and thus better determine the long range impacts of harvesting.

Contact: Peacock Forestry Services, PO Box 729, Pine Falls, Manitoba R0E 1M0.
Tel: (204) 367-8005

95-3-04 Alternative Vegetation Management Trials

Crop trees in plantations often face competition from other, undesirable species. Severe competition can eventually destroy entire plantations delaying post-harvest reforestation efforts. Vegetation management is a significant challenge faced by plantation managers if plantations are to be successful.

Initiated in 1993, the Alternative Vegetation Management Trials are evaluating different techniques for vegetation management in softwood plantations. From the information gained in these trials it may be possible to reduce the dependency on broadcast aerial herbicide applications currently used to manage competitive vegetation in plantation situations. Methods under review are:

1. Seppi forestry mower. This mower employs a series of rotating hammers to effectively shred competing vegetation. Mounted on a tractor, this mechanical treatment is commonly used to manage competing vegetation and is not considered labour intensive.

2. Hand snapping. Performed manually, hand snapping involves snapping the stems of competing shrubs, by hand, at approximately 45 cm. leaving a hinge of vegetation at the snap site.

3. Brush saw and stump treatment. Also a mechanical treatment, a small circular saw, powered by a small gas motor, is used to make a clean cut of competing stems. This is followed by application of the herbicide Glyphosate (Vision) to the stumps. This is a labour intensive treatment.

4. Ground application of herbicide. Using a motorized spray unit with a cluster nozzle mounted on a skidder, this treatment broadcast sprays the herbicide Glyphosate (Vision) directly onto competing vegetation.

In 1995, a review of alternative vegetation management options resulted in two additional techniques being added to the trials. Due to these techniques being added to the project in 1995, they are being treated as a separate study. These techniques are;

- Basal treatment with triclopyr (Release). Triclopyr is a relatively new systemic herbicide which is applied directly to the bark of competing vegetation.

- Manual Brush sawing. This techniques uses a brush saw to cut competing vegetation during the active summer growing season. The stems are cut at approximately 30 cm, or just below the lowest live lateral branch.

The 1993 trials have so far shown that ground application of Glyphosate has been the most effective at controlling aspen and shrubs. It does however result in a large increase in ground vegetation due to canopy loss, mostly in the form of herbaceous plants and grasses. The brush saw and herbicide treatment offers good aspen control without suckering. Its effectiveness in controlling shrubs is variable however and does result in an increase in ground cover. Mechanical control with the Seppi forestry mower yields fair control but is not as effective as herbicide methods. This method does see an increase in both shrubs and ground cover following treatment. Hand snapping has varying results but like the Seppi treatment it too results in shrub and ground cover increase after treatment.

It is too early to determine which treatment will be the most effective over the long run. Long term crop tree responses will be evaluated before making any conclusions. It is fair to report however that crop tree mortality

and damage is highest in the Seppi treatment with ground application of herbicide second.

Each treatment has its own advantages and disadvantages. Factors such as age of the plantation, area size, severity of competition and type of plantation must be considered when determining the type of management techniques to use. Where crop tree damage must be kept to a minimum, such as in orchard or Christmas tree plantations, a method of management which has low crop tree mortality and damage as a result of the treatment would be chosen. It should also be noted that where environmental concerns are a priority, such as those plantations which may be adjacent to a waterbody, herbicide treatments may not be a viable option.

Contact: Dan Phillippot, Pine Falls Paper Company, Woodlands Division. Box 10 Pine Falls, Manitoba, Canada R0E 1M0. Tel: (204) 367-5233.

95-3-05 Regeneration of Difficult Sites

The need for a trial test and demonstration of new and combined reforestation techniques on sites where regeneration has been difficult resulted in the creation of the regeneration of difficult sites project. Typically, these sites have severe competition and mortality rates following site preparation and planting. They are often difficult to regenerate back to a state reflective of the original stand.

Four experimental regeneration sites have been established. While they have been identified as mixed wood or lowland black spruce, each site has a unique harvesting history and soil and vegetation status. Each site therefore, has its own unique regeneration problem. As a result, the site preparation treatments vary in some degree depending upon the site characteristics.

In addition to yielding valuable information on techniques addressing the problems of regeneration in the Manitoba Model Forest, the project also provided technology transfer opportunities. Sites used for the project are to be used as demonstration sites providing a field example for practitioners interested in new and innovative methods for achieving regeneration. This project also assesses competing vegetation and planting stock survival complimenting the work being performed in the Alternative Vegetation Management project, while providing technology transfer opportunities for the future.

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95-3-06 Spruce Budworm

Like other provinces Manitoba is facing problems with spruce budworm in its forests. In fact, the spruce budworm outbreak in eastern Manitoba has persisted for almost two decades. Recent studies have indicated that this outbreak has resulted in the loss of an estimated 300,000 cubic meters of spruce /fir timber within the Manitoba Model Forest region. This loss could increase greatly if the infestation spreads unchecked to the 14,000 hectares of budworm vulnerable forest in and north of the region.

In partnership with the Pine Falls Paper Company, the Canadian Forest Service and Manitoba Forestry Branch, the Spruce Budworm project was designed to develop an effective system for monitoring budworm populations through the infected area during the pre-outbreak and early outbreak phases. To do this, pheromone trapping of adult moths was conducted at 27 plots established in the Manitoba Model Forest in 1996. This moth capture data was then correlated with

other population parameters, such as egg mass and defoliation levels in the sampling areas.

Technology transfer is an important component of Manitoba Model Forest activities. Taking information such as predictive methods to the people who will benefit from new methods is therefore necessary if Model Forest goals are to be achieved. As part of this project, two presentations on the activities and findings under this project were conducted.

Contact; Keith Knowles, Box 24, 200 Saulteaux Crescent, Winnipeg, Manitoba. Canada. R3J 3W3 Tel: (204) 945-7868

95-3-11 Understory Protection of White Spruce

White spruce is a valuable timber resource in the Manitoba Model Forest region and as such is under pressure from harvesting activities. To minimize the impacts of harvesting on white spruce understory and increase the regeneration success of these areas the Manitoba Model Forest established an operational trial and demonstration site in advanced regeneration preservation techniques as they apply to white spruce understory protection.

The operational trial and demonstration site near Little Black River was only part of this project. The most important phase involved a workshop which introduced participants to the techniques and equipment involved. The workshops, held over two days, were designed for forest managers as well as field operations personnel from industry.

The demonstration of new forestry techniques associated with protecting white spruce understory involved the use of cut and skid, or mechanical harvesting operations currently in use in the region. Participants were conducted through the planning techniques used in the trials during classroom sessions. This was followed by operational comparison of various understory protection techniques at the demonstration site. As part of the demonstration participants were given the cost / benefit relationship between present technologies and introduced technologies.

The operational trial and demonstration site will be monitored to determine the long-term biological response to post harvest operations.

The operational trial and demonstration site and workshop were carried out by the Northern Forestry Centre, Canadian Forest Service, in cooperation with Pine Falls Paper Company and Peacock Forestry Services..

Contact: Derrek Sidders, Canadian Forest Service, Northern Forestry Centre, 5320 - 122 Street, Edmonton, Alberta T6H 3S5 Tel: (403) 435-7355 Fax: (403) 435-7221

95-3-16 Hardwoods on Agricultural Lands

Over four thousand hybrid aspens were planted into Manitoba Model Forest demonstration sites as field trials began in the Hardwoods on Agricultural Lands project. The hybrids were developed as a rapidly growing hardwood crop for marginal agricultural lands.

The Manitoba Model Forest has a large agricultural region within its boundaries. Some of this land has been forested in the past but now is marginal farmland. Due to shifts in crop prices, and the amount of input necessary for traditional agricultural crops much of the marginal land becomes vacant after only a few years in production. The development of hybrid aspen represents an opportunity to have sustainable crops on lands which otherwise may remain vacant for years at a time.

Derek Sidders and Dave Cheyne of Canadian Forestry Service brought the fledgling aspens from Edmonton where the trees have been growing rapidly in greenhouses. The two researchers are managing the trees just as any other agricultural crop. The trees can be planted and maintained with traditional agricultural equipment. This means that landowners do not have to purchase specialized equipment keeping input costs low.

The aspen plantation has already been attracting considerable attention. Local farmers have made inquiries about the hybrids and interest has been expressed from other provinces. Researchers in Ontario have expressed interest in the demonstration hybrid aspen which seem to have flourished under Sidders' and Cheyne's methods.

In addition to field testing the new hybrids, alternative vegetation control methods are also being tested. Vegetation control mats, shelter cones and herbicide treatments, and broadcast herbicide treatments are being examined

Hybrid aspen are not the only species planted at the sites. Walker poplars were planted around the plantations to act as a rapidly growing shelter belt. An arboretum featuring ash, chestnut and poplar was also planted at the Highway 304 site.

Those wishing to see the aspen demonstration can visit the Highway 304 site. It is located 15 kilometres southeast of the town of Powerview.

Contact: Derrek Sidders, Canadian Forest Service, Northern Forestry Centre, 5320 - 122 Street, Edmonton, Alberta T6H 3S5 Tel: (403) 435-7355 Fax: (403) 435-7221

95-3-17 Small Equipment Demonstration

Local forest industries are often faced with microsite preparations that need specialized treatments. This often takes the form of ground sensitive treatment for wet or understory scenarios. It requires equipment which is very maneuverable, small enough to be compatible with small (woodlot) and large scale operations as well as inexpensive to operate and to transport. To meet this need, the 1995 small equipment demonstration focused on the capabilities of the Meri Crusher site preparation tool.

To perform the demonstrations a number of sites were surveyed and classified prior to treatment. These sites were also given post-treatment disturbance assessments evaluating coverage and qualifying microsites. In a number of sites, biological sample plots were established to link them with regeneration treatments.

The field demonstrations organized for the forest industry, woodlot owners and contractors gave participants the opportunity to view equipment and see practical application of equipment in situations they encounter. Demonstrations were accompanied by field notes and other reference materials so that participants could evaluate equipment and have reference materials for their future operations.

The demonstrations were carried out by the Northern Forestry Centre, Canadian Forest Service.

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Economic Development and Diversification (EDD) projects

The Economic Development and Diversification working group looks at identifying sustainable development opportunities in the Model Forest region. By encouraging the development of sustainable and diverse economic developments the Manitoba Model Forest is looking to develop a sustainable economic base in the region which is not dependant upon on one major economic endeavour or industry.

95 - 4 - 06 Wasaanaabiyaa - Shining Waters Heritage Region
95 - 4 - 09 Alternative Forest Products

95 - 4 - 06 Wasaanaabiyaa - Shining Waters Heritage Region

In 1994, The Economic Development and Diversification working group assisted in establishing a heritage region within the Manitoba Model Forest. Today, Wasaanaabiyaa - Shining Waters Heritage Region Inc., is working with communities to develop economically viable, eco-tourism, cultural and heritage ventures.

Projects conducted by the Wasaanaabiyaa - Shining Waters Heritage Region range from developing arts and crafts cooperatives to assembling oral histories from the various communities of the Manitoba Model Forest to assisting in the identification and development of eco-tourism opportunities. The Wasaanaabiyaa - Shining Waters Heritage Region actively promotes inter-community cooperation with the aim of improving and diversifying the economic activities of the region.

Contact: Wasaanaabiyaa - Shining Waters Heritage Region Inc., Lac Du Bonnet, Manitoba Tel/Fax: (204)345-9290

95 - 4 - 09 Alternative Forest Products

Part of the overall goal of the Manitoba Model Forest is to assist in the development of a forest based economy which is not restricted to the traditional timber enterprises. The Alternative Forest Products project seeks to identify non-timber forest products which are abundant in the area, have immediate market potential and can be harvested on a sustainable basis without detrimental ecological or social effects.

This study documents and locates some of the viable - non-timber special forest products of the region through literature reviews, interviews, and site inspections. It investigates known plants that occur in viable numbers and cross-references this to site information and markets.

The final phase of this project is the report and seminars. Over half the resources allocated to this project will be consumed through the transfer of information. Seminars are a hands on opportunity to view special forest products, both value added and wholesale markets, and to meet with the people who have successfully harvested and marketed these products.

Contact: Mark Mitchell & Associates, 11 Rattai Place, Winnipeg, Manitoba R2M 4W5. Tel: (204) 255-0480 Fax: (204) 253-0492

Technology Transfer (TT) Projects

"Tech Transfer" takes the knowledge of the Integrated Resource Management and Advanced Forest Practices working groups and delivers it to the people who will use it. This ensures that sustainable development can become a reality through the most up-to-date information, methods and technology developed through research.

95-5-06 Pinawa Channel Demonstration Woodlot
95-5-08 Manitoba Model Forest Open House and Symposium
"Finding a way through the forest"
95-5-10 GPS/GIS Workshops
95-5-18 Forest Pest Management Conference
95-5-19 Manitoba Model Forest Workshops - Vegetation Management Alternatives

95-5-06 Pinawa Channel Demonstration Woodlot

Small scale woodlot operations can contribute significantly to the economy of a forest region. The purpose of the Pinawa Channel Demonstration Woodlot is to provide a practical setting for woodlot management demonstrations which highlight the sustainable advantages that private woodlot owners can obtain from a well managed woodlot.

During the summer of 1995, students from the Deep River Science Academy, located in Pinawa, conducted research in the woodlot. This research, focusing on woodlot biodiversity, provides information necessary to achieving the goals of the Pinawa Channel Demonstration Woodlot . The assessment of the woodlot's biodiversity also provided an understory assessment. This information will be used to assess the diversity of understory species in relation to increasing canopy and maturity of balsam fir stands compared to black ash.

Future plans for the Pinawa Channel Demonstration Woodlot include growth and yield measurements of the woodlot's tree species, development of comparison sites for different silviculture techniques for growing Christmas trees, identification of little used forest products such as herbs, ornamental fungi and fruits.

Based upon data gathered in 1995 and previous activities, an interpretive trail is being designed to demonstrate the special areas being studied within the Pinawa Demonstration Woodlot.

Contact: Manitoba Model Forest, Box 10, Pine Falls, Manitoba. R0E 1M0. tel: (204)367-5232 Fax: (204) 367-8897.

95-5-08 Manitoba Model Forest Open House and Symposium "Finding a way through the forest"

Information, ideas, and innovative technologies are of little use if not made available to the people who are a living part of the forest. To showcase its projects and results, the Manitoba Model Forest Open House and Symposium was held on April 25, 1996, in Great Falls Manitoba. Although unseasonable snow forced the rescheduling of the event it was still a success for the researchers, students and other visitors who travelled the treacherous roads to experience the Manitoba Model Forest's showcase event.

Over forty project displays, including interactive and Internet displays introduced visitors to the Model Forest and its activities. As part of the event

an information treasure hunt was conducted for the students in attendance from Powerview school. The questions they asked as part of the treasure hunt forced many of the researchers to take a long look, not only at research in their own field, but all projects being conducted. The event was truly a learning experience for researchers and students alike.

Technology transfer is a large component of Model forest activities. State of the art technologies played a large part in Model forest research over the past year and was evident in many of the project displays. It was also evident during the live broadcast of CBC 990 am, Radio Noon. Satellite technology allowed host Diane Wreford to conduct interviews of researchers and other participants for the Radio Noon broadcast which is Manitoba's farm and resource news source. Technology, however, was no match for Mother Nature even with the expert assistance of radio technician, John Smith. Satellite communications were interrupted numerous times due to heavy wet snows and atmospheric disturbances interfering with satellite signals.

The theme for the event was "Finding a way through the forest." Flying Pigment Design Studio, of Lac du Bonnet, created a forest atmosphere through their designing and production expertise. The event, which was postponed, will be recreated by Flying Pigment, October 4, 1996, in Great Falls.

Contact: George Kynman, Communications Officer, Manitoba Model Forest, Box 10, Pine Falls Manitoba R0E 1M0. Tel: (204)367-5232. Fax: (204) 367-8897.

95-5-09 GPS/GIS Workshops

Throughout 1995 the Manitoba Model Forest sponsored a series of Global Positioning System, GPS, and Geographic Information System, GIS, workshops. The two and three day workshops were designed for users or potential users of mapping grade GPS receivers who are interested in integrating GPS and GIS technologies. Participants obtained a thorough grounding in the fundamentals of the GPS system. Hands on data collection, processing and import to a GIS system was emphasized in a combination of lab and field exercise sessions. Some of the topics included this year were: the NAVSTAR GPS system, Differential corrections, field procedures, Data processing and data conversion for GIS import.

In 1995, the great demand for GPS/GIS workshops to be held in urban areas resulted in workshops at the Harbour View Recreation Complex in Winnipeg. Other workshops were held in Dryden, Ontario The Pas, Manitoba and at Sagkeeng First Nation.

The growing demands for GIS/GPS workshops is reflective of the increased interest and need for accurate positional information for a variety of uses. The establishments of a GPS base station in Pine Falls in 1994, has increased the interest locally, as well as added an additional degree of accuracy to Manitoba Model Forest research.

Contact: Robert McMahon, GIS Database Manager, Manitoba Model Forest, Box 10, Pine Falls, Manitoba R0E 1M0. Tel: (204) 367-5232 FAX: (204)367-8895.

95-5-10 "Environmentally Friendly" Timber Harvesting Guidelines

Forest workers are coming under increasing pressure to be more environmentally responsible in their work. To assist them in becoming more responsible the Manitoba Model Forest, in partnership with Louisiana Pacific Ltd., Repap Manitoba Inc., Manitoba Natural Resources and the Pine Falls Paper

Company, designed a field manual to provide practical assistance and methods which are more environmentally responsible.

The illustrated guide provides some basic environmental protection goals and alternative harvesting techniques. The information provided can be used to shorten the forest harvest rotation time, enhance wildlife and aesthetic values while reducing the impact harvesting and related activities have on the forest as a whole. Maintaining the environmental integrity of the forest ecosystem through good long term planning and careful logging operations are essential for sustainable forestry.

Manitoba Natural Resources, MNR, through the Forest Act, has the responsibility to manage the forests of Manitoba for the betterment of Manitobans. Towards this, MNR has produced guidelines to assist the forest operator in conducting forest activities. The "Environmentally friendly" timber harvesting guideline manual is based upon the principles found in the Forest Act, the experience and recommendations of the forest workers and forest managers throughout the province.

Originally produced in the 1994-operating year the manual has been revised and is now in a more durable format. This durable format will allow the manual to be used in the field where the manual will be of the most use.

Contact: Peacock Forestry Services, PO Box 729, Pine Falls, Manitoba R0E 1M0.
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95-5-18 Forest Pest Management Conference

A two day conference exploring issues in pest management was held September 27-28, 1995 in Pine Falls, Manitoba. Conference participants attended one full day of technical presentations followed by a full day field trip to areas affected by forest pest species in the Manitoba Model Forest.

The Forest Pest Management conference featured local and speakers from across Canada. Their discussions and presentations encompassed a wide variety of topics related to insect and disease problems faced by forest professionals across Canada. Dwarf mistletoe, spruce budworm, aspen decay, terminal weevils and armillaria root rot were among the many topics discussed. In addition to discussions regarding pests themselves, technical presentations included discussions about Geographic Information System, GIS, mapping of infestations, biological controls and integrated forest health / silviculture surveys.

The Forest Pest Management conference was presented as a joint project of the Manitoba Model Forest Technical Transfer Committee and Manitoba Natural Resources, Forestry Branch. Natural resources professionals, educators, researchers, field practitioners, private woodlot owners and representatives from environmental groups were in attendance.

Contact: Terry Boyce, Manitoba Natural Resources, Forestry Branch. 200 Saulteaux Cres., Winnipeg, Manitoba. R3J 3W3 Tel: (204) 945-7615 FAX: (204) 489-1360.

95-5-19 Manitoba Model Forest Workshops - Vegetation Management Alternatives

In 1995, the technology transfer committee held workshops regarding vegetation management alternatives. The July workshops were aimed specifically at practitioners from the forest industry and government who prepare forest management plans and /or prescribe stand level silvicultural treatments. Held in Pine Falls, meeting discussions focused primarily upon the development and use of silvicultural keys to support integrated vegetation management, objectives, legal requirements, ecosystem classification and biological principles were also

covered. Presenter, Bill Towell, introduced participants to the concept of integrated vegetation management and operations.

Following workshop discussions and presentations, participants proceeded to the Belair Forest. There among the softwood, mixed wood and hardwood forests of the Belair, participants were able to conduct fieldwork. This fieldwork allowed for practical experience with the concepts discussed during the previous day's workshop.

Presenters Wayne Bell and Bill Towill summarized the process that participants went through. It was during this time that participants presented the multiple harvest strategies that they developed during the workshops, compared strategies, and discussed the relative merits and weaknesses of these strategies.

Contact; Jeff Delaney, Manitoba Department of Natural Resources, Forestry Branch, 300 - 530 Kenaston Blvd., Winnipeg, Manitoba R3N 1Z4. Tel: (204) 945-7546

Education, Culture & Public Awareness (ECPA) Projects

The Education, Culture & Public Awareness working group presents to the public all of the information developed by the various working groups, general information about the forest and the national Model Forest Program and presents it to the public. Projects encourage the use of the forest through recreation and learning opportunities, with the aim of increasing the public's awareness of sustainable development concepts and principles.

95-6-01 Video and Curriculum guide
95-6-29 Enhancing Environmental Education Using GPS & GIS Technologies
95-6-24 The North Star Trail

95-6-01 Video and Curriculum Guide

Education, especially at the grade school level, has been proven essential to having environmentally sound practices and principles integrated into mainstream lifestyles. Over the past decade, concepts and practices such as recycling and waste reduction have been introduced into mainstream society through education at the grade school level. In order for the concept of sustainable forests to become part of mainstream thinking it too must become part of grade school education.

Components of sustainable development of forest resources are currently contained in Manitoba's grade school curriculum. In order to focus these components and assist teachers in educating students about sustainable development of forests, the Manitoba Model Forest has developed a video entitled, *The Boreal Forest: A Case for Sustainability*.

Designed for integration into the Social Studies Senior 2 - North America: A Geographic Perspective curriculum, the video, with its companion curriculum guide, also encompasses portions of the Unit III - The North curriculum. Together the video and guide takes the principles of sustainable development and applies them to Canada's boreal forest. They are designed to assist students to understand the concepts of sustainable development of forests. This is accomplished through examination of the environmental, economic and social implications of the various uses of forest resources.

The curriculum guide consists of lesson plans centred on the video itself, together with four individual lesson plans, each focusing on a theme introduced in the video. In each case, the video is viewed first, followed by lesson plan or student activities.

As informed individuals, students will be in a better position to manage their activities so as to reduce any negative impacts on the forest. They will be able to evaluate various forest proposals, or media reports, and participate in forest management planning processes, environmental hearings and sustainable development in an informed manner.

The *Boreal Forest: A Case for Sustainability* and its companion curriculum guide will be distributed for use in Manitoba schools in August of 1996.

Contact: Rod Bollman, Dept. of Biology, University of Winnipeg, 515 Portage Ave., Winnipeg, Manitoba R3B 2E9. tel: (204) 786-9862. Fax: (204) 786-1824.

95-6-29

Enhancing Environmental Education Using GPS & GIS Technologies

With technology playing a greater role in the study of the environment it is becoming increasingly important that students at the secondary level receive a grounding in the technologies which they may be using in future careers. This project introduced secondary students from the Wanipigow School to Geographic Information System, GIS and Global Positioning System, GPS, technologies.

Early in 1995, Robert McMahon, Manitoba Model Forest, GIS Database Manager, provided an introduction to GPS and GIS technology at the Wanipigow school. This initial exposure to the technology raised such enthusiasm about the potential of the technology that a detailed course component was developed. In cooperation with Wanipigow science teacher, Larry Labelle, detailed course work was developed which fit into the Environmental Studies course being taught at the school.

The Manitoba Model Forest provided the school with ten copies of MapInfo software, from MapInfo Corporation for installation on its computers. The school now owns this software and will be able to use it in future courses. With equipment support from Cansel Survey Equipment Ltd., McMahon provided three weeks of theoretical and practical instruction in the use of GPS equipment and the MapInfo software. This training provided introductory skills in the use of GIS as it relates to resource management.

The field component of the GPS training was supplemented by collection of field data from mapped transects in the forest near the school. Information about flora along these transects will be used in the environmental studies course to provide a practical basis for the training which the students can relate to.

The training was very well received by the students participating in the project. In addition, members of the community noted that the training has provided some students a practical application of their education and instilled enthusiasm for resource management which had been absent previous to the project.

While the project was aimed at introducing the technology to the students it also had other benefits. It increased awareness of the type of work being done by the Model Forest and generated a greater level of participation in Model Forest activities in the local communities.

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95-6-24

The North Star Trail

The North Star Trail is located on crown land in the Belair Provincial Forest. Only 90 kilometres northeast of Winnipeg, Manitoba's provincial capital, The North Star Trail takes travellers through a variety of landscapes and ecological types. A resource package and brochure produced for the North Star Trail is based upon the landscapes, forest practices and points of interest along the route.

Originally an old logging road, the North Star Trail has been in use since the 1920's providing a link between the communities of Belair and Stead. Twenty-five kilometres in length, there is a ford crossing at Jackfish creek, six kilometres from the northern most access. Logging and gravel trucks have used portions of the trail and this high use has resulted in the southern half of the trail being a better quality road than the northern part.

There are 17 interpretive stops along the 25 kilometre trail, approximately one stop every 1.4 kilometres. Interpretive signs assist the traveller in experiencing the dynamic environments along the trail. The trail

travels through constantly changing ecological zones so the interpretive stops have been designed to be movable.

Accessible by automobile, bicycle, horse back or hiker, the North Star Trail offers something for everyone, whether it be forest history, geology, wildlife, recreation or cultural history.

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