SUSTAINABLE FOREST MANAGEMENT NETWORK

RÉSEAU DE GESTION DURABLE DES FORÊTS

LIST OF PROJECTS FUNDED BY THE SUSTAINABLE FOREST MANAGEMENT NETWORK

(1995 – 2007)

SUSTAINABLE FOREST MANAGEMENT NETWORK | RÉSEAU DE GESTION DURABLE DES FORÊTS

Purpose of Document:

This document is intended to serve as a guide to funded research projects by the Sustainable Forest Management Network (SFMN). The SFMN was a part of the National Networks of Centres of Excellence (NCE) program for 15 years (1995-2010). It brought together participants from the academic, industry, NGO, and governmental sectors to develop real solutions to sustainable forest management challenges in Canada.

Below is a summary of the projects funded between 1995 and 2007 of the SFMN tenure. For more information on the projects, or to inquire about publications from these projects, please contact Matthew Pyper- Knowledge Exchange Officer with the Department of Renewable Resources (Matthew.Pyper@ualberta.ca).

How to Use the Document:

This document has been organized by the year each project was funded, and is easily searchable using the 'find' function in Adobe Reader. We encourage you to browse the listings, or use the 'find' function to search for such things as: author, subject, keywords, title, etc.

288. Applying Regional Dynamic Models To Quebec.

Project cummingsappl13

Start Date: April 1, 2007

WHAT RESEARCH IS BEING DONE?

The SFMN's Boreal Ecology and Economics Synthesis Team (BEEST) has developed a unique suite of modelling tools for the regional spatial analysis of forest management and ecosystem processes (TARDIS - Cumming and Armstrong 2005). We propose to apply this framework to other regions of Canada, beginning with the Province of Québec, to: capitalize on past SFMN research; address priorities identified at the Québec proposal workshop, and; are tractable within the CFP parameters. Our goal is to facilitate spatially explicit analysis of tradeoffs/interactions between economic activity, disturbances and biodiversity at provincial and larger extents. The specific listed components reflect: research priorities 2 (caribou) and 8 (new regional applications and modelling advances); priorities related to protected areas and natural disturbance management; and discussions with members of the Bureau du Forestier en Chef and other departments in Québec and Ducks Unlimited, and with the leaders of companion proposals (Adamowicz, Macdonald and Wiersma).

WHERE IS THE RESEARCH BEING DONE?
Canada-wide

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Steve Cumming

Researchers
Pierre Drapeau, *Fréderic Raulier*, *Daniel Fortin*, *Andre Desrochers*

287. Assessing The Effectiveness Of Forest Certification As A Means To Achieve SFM In Canada.

Project larsonasse13

Start Date: April 1, 2007

WHAT RESEARCH IS BEING DONE?

Although forest certification has gained momentum in Canada, little has been done to assess its effectiveness. Prior research has focused almost exclusively on the impacts of the FSC standard, with most past studies evaluating the regional effectiveness of forest certification. The role of certification has also been studied at an international scale through its influence on trade. A recent study by the research team evaluated forest certification effects on forest practices in British Columbia, but no project has so far analyzed the effectiveness of forest certification in different locations across Canada. This study attempts to close this gap.

WHERE IS THE RESEARCH BEING DONE?
British Columbia

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Bruce Larson

Researchers

Peter Duinker, *John Innes*, *Robert A. Kozak*, *Ron Trosper*

286. Climate Change Vulnerability And Adaptation For Forest Management In Canada.

Project johnstonmclim13

Start Date: April 1, 2007

WHAT RESEARCH IS BEING DONE?

Climate change is expected to affect forests in Canada to a greater extent than in other regions (IPCC 2001). Forests will likely experience impacts such as increased fire and insect outbreaks, dieback, shifts in species distributions and changes in productivity (Johnston et al. 2006). Climate change will also affect global market structure which may have important implications for investment in the Canadian forest sector.

WHERE IS THE RESEARCH BEING DONE?
Canada-wide

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Mark Johnston

Researchers
Alison D. Munson, *Martin Moroni*, *Amy Thompson*, *Tim Williamson*, *Ben Rubin*

285. Development And Experimentation Of Sustainble Forest Management Strategies: Biological And Aboriginal Feasibility.

Project valeriaodéve13

Start Date: April 1, 2007

WHAT RESEARCH IS BEING DONE?

Environmental conditions and natural disturbances such as forest fires, insect epidemics and diseases, all contribute to shape the forest. Since the vegetation of the boreal forest is adapted to these disturbances, EBM, by attempting to emulate this dynamics, may prove a promising avenue (Booth et al. 1993, Harvey et al. 2002). EBM is a tool using silvicultural practices (cutblocks, stands) and landscape level management strategies to shape the forest within the range of the ecosystem's natural variability (Bergeron and Harvey 1997, Angelstam 1998, DeLong and Kessler 2000) so that its associated organisms can be maintained in conditions to which they are adapted (Seymour and Hunter 1999). In more concrete terms, EBM attempts to produce cuts that resemble natural disturbances in terms of frequency, severity and distribution (Haeussler and Kneeshaw 2003). While we appreciate that logging can never fully duplicate the effects of fire, efforts can nonetheless be made in order to approximate certain characteristics effected by the passage of fire such as size, shape and pattern as well as retention of woody debris and rate of cut.

WHERE IS THE RESEARCH BEING DONE?
Qubec

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Osvaldo Valeria

Researchers
Yves Bergeron, *Pierre Drapeau*, *Dan Kneeshaw*, *Alain Leduc*, *Louis Bélanger*, *Fréderic Raulier*, *Martin Pelletier*, *Louis Imbeau*, *Hugo Asselin*, *Marie St-Arnaud*

284. Ecological And Economic Trade-Off Analysis Of Conservation Strategies For Woodland Caribou.

Project adamowiczvecol13

Start Date: April 1, 2007

WHAT RESEARCH IS BEING DONE?

At least 4 landscape level management actions have been proposed in response to declining caribou numbers: (1) limiting industrial footprint in areas occupied by caribou, (2) altering the industrial footprint to discourage predator and alternate prey use, (3) culling of predators, and (4) increasing hunter harvest of alternate prey. The efficacy of these actions depends on caribou population growth rate, current and projected industrial footprint, and prey and predator densities on and surrounding caribou range.

WHERE IS THE RESEARCH BEING DONE?
Canada-wide

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Vic Adamowicz

Researchers
Stan Boutin, *Steve Cumming*, *Grant Hauer*, *Fiona Schmiegelow*, *Marian Weber*

283. Ecological Implications Of Altering The Composition Of Mixedwood Forests.

Project macdonaldeecol13

Start Date: April 1, 2007

WHAT RESEARCH IS BEING DONE?

Ecological, economic and social implications of altering the composition of mixedwood forests. Specifically, we will address our state of knowledge concerning the significance of a change in composition of mixedwood forests at various scales in terms of effects on ecological characteristics and processes of the forest. We will include consideration of biodiversity and functional aspects of carbon and nutrient budgets. This State of Knowledge initiative follows directly on research conducted by the proponents, both through the SFMN and other initiatives

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Ellen Macdonald

Researchers
Yves Bergeron, *Pierre Drapeau*, *Sylvie Quideau*, *John Spence*, *Tim Work*, *Suzanne Brais*

282. Evaluating The Potential Effect Of Insect Outbreaks On Sustainable Forest

Management.

Project kneeshawdeval13

Start Date: April 1, 2007

WHAT RESEARCH IS BEING DONE?

This project will investigate how insect outbreaks of major forest pests across the country interact with processes at different spatiotemporal scales (i.e., stand composition, landscape pattern, and regional climate change) to affect successional trajectories across the nation. It will thus complement Chen's project that focuses on succession primarily following fire and harvesting, Messier's project by developing SFM tools and MacLean's project by evaluating insect effects on management.

WHERE IS THE RESEARCH BEING DONE?
Canada-wide

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Dan Kneeshaw

Researchers
Phil Burton, *Brian Sturtevant*, *Rongzhou Mann*, *Michael Papaik*, *Jim Rice*

281. Impacts Of Technological Innovations In The Forest Products Value Chain On SFM.

Project mcfarlanepimpa13

Start Date: April 1, 2007

WHAT RESEARCH IS BEING DONE?

Consumption of forest products is a major source of pressure on forest ecosystems. However, relatively little research has been undertaken to link societal demand for forest products to the challenges confronting sustainable forest management (SFM). Over the last 40 years, the forest sector has made substantial progress in substituting knowledge and capital for material input and such developments have had significant impacts on SFM. For example, technological developments in the Canadian forest products sector have resulted in: 1. increased wood, panel and fibre recovery rates; 2. improved productivity; 3. increased automation and mechanization; 4. consolidation leading to fewer, larger mills; 5. significant shifts in the wood and fibre characteristics sought from the forest; 6. fewer jobs per unit round wood harvested; 7. fewer forest dependent communities.

WHERE IS THE RESEARCH BEING DONE?
Canada-wide

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Paul Mcfarlane

Researchers
D. Grant Allen, *Jerome Alteyrac*, *Emmanuel Ackom*

280. Implementing And Testing Decision Support Tools To Evaluate Forest

Management Scenarios For SFM: A Multiple Scale And Perspective.

Project messiercimpl13

Start Date: April 1, 2007

WHAT RESEARCH IS BEING DONE?

The proposed extension of our project messiercimpl10 addresses current priority 1 - stand dynamics and succession, priority 2 - evaluation of the impacts of insect outbreaks on sustainable forest management, and priority 5 - woodland caribou analysis. The extension is designed to use the model toolkit developed during the three years of the project to investigate how management activities and disturbance across the boreal forest biome in Canada and Europe interact with processes at multiple spatiotemporal scales (i.e., stand composition, landscape pattern, and regional climate change) to affect successional trajectories. It will thus complement Chen's project that focuses on succession primarily following fire and harvesting, and MacLean's project by evaluating the effects of recent insect outbreaks in Labrador on management.

WHERE IS THE RESEARCH BEING DONE?
Canada-wide

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Christian Messier

Researchers
Marie-Josée Fortin, *Dan Kneeshaw*, *Brian Sturtevant*, *Frédérik Doyon*, *Michael Papaik*

279. Implications For Water Resources Of Activities On The Forested Land-Base.

Project creediimpl13

Start Date: April 1, 2007

WHAT RESEARCH IS BEING DONE?

Our goal is to assess potential effects of forest management and disturbance on surface water and groundwater resources, based on a synthesis of scientific/government literature and expert opinion. This will lead to: (1) web available data synthesis; (2) a meta analyses to support a systems-based understanding of scientific, social, economic and political factors influencing water resources in forested landscapes; (3) thought experiments to explore interactions of climate change and disturbance, both natural and anthropogenic, on water resources in forested landscapes (e.g., extreme disturbances). This work will lead to recommendations for Sustainable Forest Management (SFM) strategies and operational practices to minimize potential adverse effects.

WHERE IS THE RESEARCH BEING DONE?
Canada-wide

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Irena Creed

Researchers
Jim Buttle, *Dan Moore*, *Margaret Donnelly*

278. Influence Of Relative Density And Composition On Growth And Understory

In Boreal Mixedwoods.

Project comeaupinfl13

Start Date: April 1, 2007

WHAT RESEARCH IS BEING DONE?

This study will use data from permanent and temporary sample plots established by SFM partners in boreal aspen, spruce and mixedwood stands in Alberta, B.C. and Ontario to examine the use of stand density index and other crowding indexes for linking early stand conditions to future conditions.

WHERE IS THE RESEARCH BEING DONE?
Canada-wide

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Phil Comeau

Researchers
Han Chen, *Ken Greenway*, *Chris Hawkins*, *Mike Bokalo*

277. Natural Capital And Ecosystem Valuation As A Tool For Sustainable Forest Management.

Project adamowiczvnatu13

Start Date: April 1, 2007

WHAT RESEARCH IS BEING DONE?

A comprehensive literature review that will focus on a wide array of domestic and international sources, and include examples of innovative, market-based approaches to managing forest natural capital. Interviews with leading experts both in Canada and abroad.

WHERE IS THE RESEARCH BEING DONE?
Canada-wide

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Vic Adamowicz

Researchers
Stewart Elgie, *Michael Howlett*, *Marian Weber*, *Nathalie Chalifour*

276. New Modelling Approaches For Predicting Hydrologic Effects Of Intense Forest Disturbance.

Project moorernewm13

Start Date: April 1, 2007

WHAT RESEARCH IS BEING DONE?

This proposal responds to the topic Terrestrial aquatic ecosystem linkages: Hydrological impacts of intense disturbance of the terrestrial system, and focuses on the mountain pine beetle (MPB) outbreak in western Canada. MPB could ultimately spread across boreal Canada through the extensive Jack pine stands. In addition, outbreaks of other forest pests are likely to occur

throughout Canada (e.g., spruce bark beetle) in association with the current tendency to warmer climatic conditions.

WHERE IS THE RESEARCH BEING DONE?
Alberta
British Columbia

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Dan Moore

Researchers
Markus Weiler, *Sarah Boon*, *Darryl Carlyle-Moses*

275. Protected Areas In Sustainable Forest Management: Finding Innovation Across Knowledge Systems.

Project wiersmayprot13

Start Date: April 1, 2007

WHAT RESEARCH IS BEING DONE?

Sustainable forest management (SFM) is a goal expressed by government agencies, aboriginal peoples, resource based communities, NGOs, and industry in boreal Canada. However, each has differing viewpoints with respect to the relative contribution of protected areas (PAs) to SFM. A key component of this may be different views along a continuum of what protected means; from strictly protected and spatially exclusive areas, through to variable management prescriptions or regulations in the landscape.

WHERE IS THE RESEARCH BEING DONE?
Canada-wide

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Yolanda Wiersma

Researchers
Peter Duinker, *Fiona Schmiegelow*, *Glen Hvenegaard*, *Wolfgang Haider*

274. Reviewing Canadian Experience Of Harmonization Between First Nations And Forest Industries.

Project wyattsrevi13

Start Date: April 1, 2007

WHAT RESEARCH IS BEING DONE?

In recent years, researchers, including SFMN members, have examined case studies and reviewed a diversity of issues, noting particularly both the benefits of and barriers to collaboration and the role of governance in establishing the context for relations. The SFMN conceptual framework now makes it appropriate to go beyond case studies, to review combined experience and research of various forms of collaboration.

WHERE IS THE RESEARCH BEING DONE?
Canada-wide

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Stephen Wyatt

Researchers
Luc Bouthillier, *Dave Natcher*, *Ron Trosper*

273. Shared Land Use: Management Of Cumulative Resource Development In The Treaty #8 Region Of Canada..

Project Frideresjshare13

Start Date: April 1, 2007

WHAT RESEARCH IS BEING DONE?

The goal of this project is to determine how the cumulative impacts of development on Treaty 8 First Nations' communities can best be managed given the diverse nature of resource developments and policy environments that exist in the different provincial/territorial jurisdictions throughout the Treaty 8 settlement area. It will develop modules for the implementation of a cumulative effects tool, including both social and ecological impacts, and will examine the policy environments that are leading to differing interpretations of the Treaty.

WHERE IS THE RESEARCH BEING DONE?
Alberta
British Columbia
Northwest Territories
Saskatchewan

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
James S. Frideres

Researchers
John Innes, *Brenda Parlee*, *Monique Ross*

272. The Economics Of Aboriginal Land Use.

Project kantsthee13

Start Date: April 1, 2007

WHAT RESEARCH IS BEING DONE?

Aboriginal culture and land-use practices are synonymous with the sustainability. Hence, an understanding of the economics of Aboriginal land use is a prerequisite to understand the economics of SFM. The 2007-08 Conceptual Framework has recognised the importance of Aboriginal values and land use practices by including "Aboriginal" and "Non-timber" as Social and Economic Criteria, respectively, Aboriginal tenure as a part of Policies, natural areas as one of the land uses, and other land uses which should also include Aboriginal land use. In Research Priorities, the SFMN opened a door for innovative projects, and placed a high priority on addressing Aboriginal issues. This project is being proposed in view of these priorities. The project is highly innovative and greatly appreciated by Aboriginal people.

WHERE IS THE RESEARCH BEING DONE?
Canada-wide

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Shashi Kant

Researchers
Ilan Vertinsky

271. Toward Adaptive Ecosystem Management: Dialogue With Pikangikum And Moose Cree For Keeping The Land.

Project davidson-huntitowa13

Start Date: April 1, 2007

WHAT RESEARCH IS BEING DONE?

The objective of the project is to develop a multi-scale adaptive ecosystem management (AEM) framework that is rooted in aboriginal concepts of the land. Both Ojibway and Cree variations of the term for land (ahkee/aski) are multi-scale terms covering different scales from family territories to large regions.

WHERE IS THE RESEARCH BEING DONE?
Ontario

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Iain Davidson-Hunt

Researchers
Fikret Berkes, *Dave Natcher*, *Roy Sidders*, *Alex Peters*, *John Turner*

270. Barriers To The Management Of Cumulative Effects Of Development In The Treaty 8 Region Of Canada.

Project innesjbarr12

Start Date: June 1, 2006

WHAT RESEARCH IS BEING DONE?

The goal of this project is to determine how the cumulative impacts of development on Treaty 8 First Nations' communities can best be managed given the diverse nature of resource developments and policy environments that exist in the different provincial/territorial jurisdictions throughout the Treaty 8 settlement area. It will develop modules for the implementation of a cumulative effects tool, including both social and ecological impacts, and will examine the policy environments that are leading to differing interpretations of the Treaty.

WHERE IS THE RESEARCH BEING DONE?
Alberta
British Columbia

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
John Innes

Researchers
John Nelson, *Brenda Parlee*, *James S. Frideres*, *Ron Trosper*, *Diane Abel*, *Doug Braybrook*,

Kieran Broderick, *Stewart Cameron*, *JR Giroux*, *Monique Passelac-Ross*, *Ray Yellowknee*, *Danny Way*, *Jim Webb*

269. Designing And Implementing Integrated Strategies: Risks And Opportunities Of An Integrated Landscape Management Strategy In Western Canada..

Project raynerjdesi12

Start Date: June 1, 2006

WHAT RESEARCH IS BEING DONE?

The purpose of the project is to allow policy makers to design and implement an integrated approach to resource management on the basis of evidence about designs that work and designs that have run into problems. An integrated approach at the landscape level is indicated where multiple stakeholders are operating on the same forested landscape and policy makers are pursuing multiple objectives with respect to them.

WHERE IS THE RESEARCH BEING DONE?
Alberta
British Columbia
Manitoba

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Jeremy Rayner

Researchers
Keith Brownsey, *Michael Howlett*, *Darcy Mitchell*, *Chris Tollefson*, *Diana Boylen*, *Adam Wellstead*

268. Developing Biodiversity Patterns For Predicting The Effect Of Management On The Boreal Mixedwood Forests Of Alberta.

Project hefdeve12

Start Date: June 1, 2006

WHAT RESEARCH IS BEING DONE?

This research aims to describe and quantify biodiversity patterns in boreal mixedwood forests and related them to basic theory in order to understand the distribution, function and maintenance of biodiversity in these ecosystems. This entails documenting species-abundance relationships, species-area curves, species turnover across landscapes, food web structures and tree size variation, for plants and insects, two numerically most diverse and biologically most important taxa in boreal forests. These biodiversity patterns are trusted measures of ecosystem integrity, are relevant for integrated models and thus are useful for assessing and predicting the effect and success of sustainable management on mixedwood forests.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Fangliang He

Researchers

Charmaine Dean, *David Langor*, *Brian McGill*, *John Spence*, *Felix Sperling*, *Jan Volney*, *Tim Work*, *Allan Carroll*, *John Stadt*

267. Forest Successional Dynamics In The Eastern-Central Canadian Boreal Forests: Modeling Compositional And Structural Pathways And Their Diversity Characteristics.

Project chenhfore12

Start Date: June 1, 2006

WHAT RESEARCH IS BEING DONE?

Our purpose is to further our understanding of forest compositional and structural dynamics with and without disturbances, and to improve our ability to project future forest conditions.

WHERE IS THE RESEARCH BEING DONE?
Manitoba
Ontario
Qu&#65533;bec

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Han Chen

Researchers
Yves Bergeron, *Norm Kenkel*, *Dan Kneeshaw*, *Alain Leduc*

266. Hydroecological Landscapes Of Canada's Forests.

Project buttlejhydr12

Start Date: June 1, 2006

WHAT RESEARCH IS BEING DONE?

We are proposing to combine previous and ongoing project data on terrestrial-aquatic linkages across Canada's forest landscapes in order to produce a framework for quantifying hydrologic, geomorphic and ecologic processes of forest landscapes at the national level. Based on this framework, we will define quantitative criteria and indicators for detecting hydroecologic responses to forest management activities. We will also test the ability of various modelling strategies to scale study results obtained at the local level to entire drainage basins in order to assess the cumulative effects of management activities in different forest landscapes across Canada.

WHERE IS THE RESEARCH BEING DONE?
Canada-wide

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Jim Buttle

Researchers
Fred Beall, *Irena Creed*, *Kevin Devito*, *Carl Mendoza*, *Dan Moore*, *Andre Plamondon*, *Paul Sibley*, *Uldis Silins*

265. Market And Institutional Structures, Economic Welfare And Global Competitiveness Of The Canadian Forest Industry.

Project kantsmark12

Start Date: June 1, 2006

WHAT RESEARCH IS BEING DONE?

The main purpose of the project is to develop and employ appropriate economic models and techniques to (i) examine the impact on the economic wellbeing of Canadians and on the forest industry (in aggregate and in selected provinces) of market conditions and government policies (such as trade actions, forest tenures, including Aboriginal tenures, protected area policies, and policies related to mountain pine beetle infestation); and (ii) evaluate the global competitiveness vis-à-vis other countries of different sectors of the forest industry and selected provinces.

WHERE IS THE RESEARCH BEING DONE?
Canada-wide

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Shashi Kant

Researchers
Susanna Laaksonen-Craig, *Van Lantz*, *Junchang Liu*, *Brad Stennes*, *Anne Toppinen*, *Bill Wilson*, *G. Cornelis van Kooten*, *ZAGP eSilva*

264. Tools For Generating Maps Of Hydrologically Sensitive Areas For Use In Forest Operations Planning.

Project arpptool12

Start Date: June 1, 2006

WHAT RESEARCH IS BEING DONE?

Our research goals are (a) to demonstrate the applicability of the mapping of hydrologically sensitive areas (HSAs) for the forest management and forest operations context, at partner-selected locations across Canada, with a geo-spatial resolution of 10 m or better, (b) to advance our understanding about processes controlling formation of HSAs and (c) to develop HSA-interpretation and planning tools for a priory recognition and determination of soil disturbance susceptibilities, at two data-intensive sites on the boreal plain (Alberta) and the Hudson plain (Ontario).

WHERE IS THE RESEARCH BEING DONE?
Alberta
British Columbia
Manitoba
New Brunswick
Newfoundland and Labrador
Nova Scotia
Ontario

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Paul Arp

Researchers
Paul Arp, *Jim Buttle*, *Irena Creed*, *Kevin Devito*, *Paul Sibley*, *Ron Trosper*, *Markus Weiler*

263. Using Interactive Forest Planning Models And Visualization To Assess Public Preferences For Trade-Offs Among Possible SFM Futures.

Project manesstusin12

Start Date: June 1, 2006

WHAT RESEARCH IS BEING DONE?

The main goal of this study is to work directly with practitioners and local stakeholders in order to learn more about how the public would make trade-offs on critical SFM planning issues, as part of a reciprocal learning and decision-support process. A second goal of the study is to assess the effectiveness of novel methods of information presentation designed to make the communication of complex spatial and temporal dynamics more useful to resource managers and more understandable and meaningful to local stakeholders and community representatives, using interactive visualization-based interfaces tied to SFM planning models; this would also enable us to assess public confidence in forest planning models and strategies in order to further elicit stakeholder preferences and assist in making resource management decisions.

WHERE IS THE RESEARCH BEING DONE?
British Columbia

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Thomas Maness

Researchers
Erin Bayne, *Robert A. Kozak*, *Tim McDaniels*, *Stephen Sheppard*, *Jan Aune*, *Scott Herron*, *Len Hunt*, *David Price*

262. Management Implications Of Forest Dynamics, Succession, And Habitat Relationships Under Differing Levels Of Silviculture In New Brunswick Forests.

Project macleandmana11

Start Date: May 1, 2005

WHAT RESEARCH IS BEING DONE?

Our project will achieve a better understanding of the successional dynamics of the Acadian forest, its value as habitat, and the diversity and habitat implications of current management. Using this understanding, we plan to devise and evaluate alternative stand- and forest-management strategies - such as TRIAD zoning (allocating reserve, intensive, and extensive zones) - that are aimed at maintaining the diversity and habitat values of the forest, while ensuring an economic supply of industrial raw material. We will: Develop an ecologically-relevant definition of mixedwood stands, based on stand dynamics and habitat relationships; Describe the successional dynamics and habitat value of 3 key stand types (natural mixedwoods, plantations, and precommercially thinned stands); Evaluate biodiversity indicators and habitat suitability (bryophytes, ground vegetation, American marten (Martes americana), birds, northern flying squirrel (Glaucomys sabrinus), and salamanders) in these stand types; and Conduct manipulative experiments to test hypotheses on the relationships between stand structure and

diversity and habitat indicators.

WHERE IS THE RESEARCH BEING DONE?
New Brunswick

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Dave MacLean

Researchers
Martin Béland, *Thom Erdle*, *Graham Forbes*, *Kate Frego*, *Mark Roberts*, *Claude Samson*, *Marc-André Villard*, *Ken Greenway*, *Bob Wagner*, *Jeremy Wilson*, *Gaétan Pelletier*

261. A Participatory Approach To Aboriginal Tenure Reform In Canada.

Project natcherdpart11

Start Date: April 1, 2005

WHAT RESEARCH IS BEING DONE?

Our project will assess the opportunities and obstacles associated with the design and implementation of a variety of forest tenures held and negotiated by Aboriginal groups. We will conduct 3 case studies to develop a framework that: Encompasses the relationships between Aboriginal communities, governments, industry, and other stakeholders; Serves as a vision for the types of institutional relationships required for successful forest tenures; and Provides a yardstick by which to measure progress. Our results and methodology will inform future forest policy, and will be of particular value to First Nations in Canada who are seeking tenure reforms within their traditional territories.

WHERE IS THE RESEARCH BEING DONE?
British Columbia
Newfoundland and Labrador
Yukon

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Dave Natcher

Researchers
George Hoberg, *Shashi Kant*, *Jamie Lawson*, *Adrian Tanner*, *Ron Trosper*, *Paul Bloom*, *Dave Crampton*, *Larry Innes*, *Richard Nuna*, *Monique Passelac-Ross*, *Stephen Wyatt*, *Tonia Mills*

260. Developing A Science-Based Decision Support Framework For Shoreline Forest Management.

Project sibleypdeve11

Start Date: April 1, 2005

WHAT RESEARCH IS BEING DONE?

Our project will: Develop a science-based decision support framework that: (1) helps balance competing values for riparian use; and (2) can be used by the forest industry and government in Ontario and across Canada, as part of an effective strategy for sustainable shoreline forest management; Devise spatially-explicit hydrologic and ecological models to supply key lines of evidence to support decision points within the framework. These models - derived from

biogeochemical, ecological, and hydrologic studies - will relate indicators of response (biotic communities, water chemistry) to selected indicators of disturbance (percent watershed harvested, size of watershed), at different spatial scales (stream reach, stream site, watershed); and Bring together researchers under an integrated network, to conduct coordinated projects that address questions related to the response of forest riparian zones to forest harvesting, in the boreal region of Ontario.

WHERE IS THE RESEARCH BEING DONE?
Ontario

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Paul Sibley

Researchers
Fred Beall, *Jim Buttle*, *Andy Gordon*, *Rob Mackereth*, *Jim Mclaughlin*, *Louis Bélanger*, *Joe Churcher*, *Brady Deaton*, *Dave Morris*

259. Dynamics Of Woody Debris In Eastern Boreal Forests: Implications For Carbon And Wildlife Management.

Project malcolmjdyna11

Start Date: April 1, 2005

WHAT RESEARCH IS BEING DONE?

Our project will: Determine the relationships among the dynamics of woody debris (WD) - such as downed logs and standing dead trees - and associated biological communities and carbon supplies; and Use the process-based TRIPLEX ecosystem model to examine tradeoffs, by investigating the implications of different scenarios of WD retention and biomass harvesting, for biological diversity, carbon supply and fluxes, and ecosystem productivity. We will: Determine thresholds of WD supply for WD-associated organisms (cavity-nesting birds, fungi, insects, and small mammals), in study plots that represent a range of WD quantities and management types, and that are sampled before and after manipulation of WD supply; Examine key ecological interrelationships between: (1) small mammal productivity and WD-associated production of insects and fungi; (2) the richness of fungal communities, and the richness of certain insect groups and their parasitoids; and (3) primary cavity excavators and secondary cavity users; Measure the temporal progression of WD decay and WD carbon stocks; and Sample above- and below-ground carbon stocks at the study sites, and at additional sites that represent differing times post-harvest. This project is partially funded under the Sustainable Forest Management Network/BIOCAP Canada Foundation Joint Venture Agreement.

WHERE IS THE RESEARCH BEING DONE?
Ontario
Qubec

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Jay Malcolm

Researchers
Pierre Drapeau, *Ian Thompson*, *Wally Bidwell*, *John Klironomos*, *Gillian Mceachern*, *Jean-Marc Moncalvo*, *Changhui Peng*, *Mark Ryans*, *Sandy Smith*, *Derrick Romain*, *Bob Watt*

258. Incentive Policies For Sustainable Forest Management.

Project webermince11

Start Date: April 1, 2005

WHAT RESEARCH IS BEING DONE?

Using the Alberta boreal forest as a case study, our project will determine how to move from theory to application of incentive-based instruments for achieving environmental objectives in the boreal forest. We will: Identify market-based incentive programs applicable to Alberta's boreal forest; Quantitatively explore outcomes of incentive programs, such as conservation easements and tradable landuse rights (TLRs); Evaluate incentive programs in terms of various criteria, such as: (1) consistency with the existing legal framework for land management; (2) compliance, monitoring, and enforcement costs; (3) economic efficiency; (4) distribution and equity; (5) environmental effectiveness; and (6) ability to integrate multiple resource management objectives; Consider the institutional feasibility of incentive programs, including legal constraints, and requirements for implementation and integration of Aboriginal rights and obligations; Identify opportunities for Aboriginal communities to use incentive programs to develop new markets and/or livelihoods from environmental services; Determine the public preferences for tradeoffs between outcomes from different incentive programs; and Develop recommendations on integrating natural capital indicators into policy objectives and instruments.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Marian Weber

Researchers
Vic Adamowicz, *Stan Boutin*, *Peter Boxall*, *Joseph Doucet*, *Monique Passelac-Ross*, *Elizabeth Wilman*

257. Natural Regeneration Of White Spruce Following Logging In Mixedwoods.

Project lieffersvnatu11

Start Date: April 1, 2005

WHAT RESEARCH IS BEING DONE?

Our project will devise and test a model of natural white spruce recruitment that can be used to develop recommendations for silvicultural practices aimed at facilitating natural regeneration of white spruce, in logged boreal mixedwood stands. To build this model, we need to determine the conditions (competing vegetation, seedbed, seed source, silvicultural treatment, and time since disturbance) under which natural regeneration of white spruce will be successful. This will involve documenting competing vegetation, densities, size, and survival of naturally-regenerated white spruce, on sites that were exposed to different types of silvicultural treatment (site preparation versus no site preparation, and winter versus summer logging) at various times (up to 30 years post-harvest). Research notes can be downloaded from:
http://www.cefm.rr.ualberta.ca/Index.asp?page=research_notes

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Vic Lieffers

Researchers
Ellen Macdonald, *David Greene*, *Ken Greenway*, *Gitte Grover*

256. Spatial Forest Management Planning Under Uncertainty Due To Natural Disturbance.

Project martelldspat11

Start Date: April 1, 2005

WHAT RESEARCH IS BEING DONE?

In this project, we will: Develop a framework that both researchers and managers can use to evaluate existing spatial forest management planning models and forest management plans. This will involve: (1) establishing a protocol for benchmarking spatial forest management models and decision support systems; and (2) launching a public web site to communicate this protocol, distribute benchmarking problems, and disseminate benchmarking results; Formulate and test new stochastic spatial forest management planning models that address the planning needs identified by our government and industrial partners, while accounting for sources of uncertainty - natural or anthropogenic disturbance processes - that they feel have the most significant impact on their spatial planning practices; and Devise improved methods for solving spatial forest management planning optimization problems.

WHERE IS THE RESEARCH BEING DONE?
Alberta
British Columbia
New Brunswick
Nova Scotia
Ontario

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Dave Martell

Researchers
Kevin Crowe, *Eldon Gunn*, *Evelyn Richards*, *Andreas Weintraub*

255. The First Remeasurement Of The Emend Experiment And Associated Work.

Project spencejfirs11

Start Date: April 1, 2005

WHAT RESEARCH IS BEING DONE?

Our project will remeasure aspects of biodiversity, silviculture, and soil productivity 5 years after harvest and 2 years after slash burns, as part of the ongoing, large-scale (1,000 hectare) Ecosystem Management Emulating Natural Disturbance (EMEND) experiment. EMEND was established in the boreal mixedwood forest of northwestern Alberta in 1999, to investigate the short- and long-term effects of partial cutting and variable retention forestry. The remeasurements will help us determine the: (1) degree of similarity between recovery from harvesting designed to emulate natural disturbance and wildfire; and (2) speed of recovery toward the characteristics of uncut forest. We will: Examine drivers of composition, diversity,

and spatial distribution of bryophyte and other understory communities; Assess the short-term effects of the EMEND treatments on beetle and moth biodiversity; Describe the mechanisms behind apparent (local abundance) and actual (reproductive success) response of songbirds, and develop empirical and theoretical relationships between local and landscape implications of harvesting strategies; Evaluate the growth of white spruce seedlings established on the mechanical site preparation (MSP) treatments in 1999; and Measure microbial communities, organic matter quality, and soil nutrient availability after fire (controlled burning); analyze the linkages among them; and compare the post-fire and post-harvest results.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
John Spence

Researchers
Barbara Kishchuk, *David Langor*, *Vic Lieffers*, *Ellen Macdonald*, *Cindy Prescott*, *Sylvie Quideau*, *Fiona Schmiegelow*, *Tim Work*, *Peter Blenis*, *Derek Johnson*, *Derek Sidders*, *Markus Thormann*

254. Tree Mortality Following Partial Stand Harvests: A Cross-Canada Study.

Project thomasstree11

Start Date: April 1, 2005

WHAT RESEARCH IS BEING DONE?

As the first broad-scale study of post-harvest mortality in representative partial-harvest riparian and upland forest ecosystems across interior Canada, our project will: Quantify the temporal pattern and mechanisms of post-harvest tree mortality; Assess the causes of post-harvest mortality; Obtain robust estimates of average rates of post-harvest mortality, at an operational scale; Modify the SORTIE and SORTIE-boreal stand models to incorporate post-harvest mortality functions; and Use these modified models to: (1) examine the impacts of post-harvest mortality on forest growth and yield and coarse woody debris (CWD) recruitment; and (2) provide assessments of management options.

WHERE IS THE RESEARCH BEING DONE?
Alberta
Manitoba
Ontario
Qu&#65533;bec
Yukon

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Sean Thomas

Researchers
John Caspersen, *Art Groot*, *Norm Kenkel*, *Vic Lieffers*, *Christian Messier*, *Frank Berninger*, *George Bruemmer*, *Carl Burgess*, *John Dojack*, *Gordon Kayahara*, *Paul Leblanc*, *François Provost*, *Peter Schleifenbaum*, *Gitte Grover*, *Martin Hubbes*, *Bill Cole*

253. An Integrated Resource Management Proposal For The Special Management Area In North-Central Alberta.

Project hickeycinte9

Start Date: June 2, 2004

WHAT RESEARCH IS BEING DONE?

Our project will provide data and models for the development of an integrated resource management (IRM) plan, for the traditional lands of the Little Red River Cree Nation (LRRCN) in the north-central region of Alberta. We will: 1. Examine community values and cultural sustainability, including: (1) community land use; (2) values toward the forest; (3) perceptions of access and limitations on access by LRRCN community members; (4) effective institutions; and (5) alternative land management systems; 2. Investigate the effects of industrial activity on the habitat and ecology of the wood bison, in the Caribou Mountains-Lower Peace River area of northern Alberta; 3. Assess the economic viability of the region, by investigating the: (1) adequacy of the forest resource base; (2) possibility of increasing the resource base, through intensive plantation of marginal agricultural land; (3) potential to increase benefits from the forest resources, through value-added wood product output; and (4) feasibility of relying on carbon contracting and/or carbon credit trading to help finance silvicultural investments; 4. Train a community member to use the ALCES multiple/cumulative effects model, to ensure integration of the results from this project and from previous research. The community member will be responsible for ongoing data entry, as well as the generation of "what if"; scenarios for our economic optimization model, and alternative scenarios for tradeoff analysis and decision-making; and 5. Develop an economic optimization model that will use economic data from various sources, along with the "what if"; scenarios generated from ALCES, and provide a means for linking medium-term with long-term outcomes. The information from this model can be compared with output from ALCES, or fed back into ALCES, to provide some indication of the ecological tradeoffs that result from economic decisions, projected 100 to 200 years into the future.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Cliff Hickey

Researchers
Stan Boutin, *Case Van kooten*

252. Cumulative Impacts Of Development On Forests In Northeast British Columbia: Pilot Study.

Project innesjcumu9

Start Date: June 2, 2004

WHAT RESEARCH IS BEING DONE?

Our project will develop and apply methods to assess the multiple and cumulative impacts of development on the forests and Aboriginal forest-dependent communities of northeastern British Columbia, using techniques drawn from forestry, ecotoxicology (the study of toxic substances in the environment), and other disciplines. We will look at the impacts of recent and future developments on the forests. At the start of the project, we will identify the issues of greatest

concern to the First Nations in the area. A key objective of the project will be the development of a tool to analyze the likely impacts of a proposed development. The importance of the impacts will vary between different groups, and the development of a mutually-acceptable impact assessment model will be a significant milestone for the project. This model will be modular, enabling other issues to be addressed in the future. Agreement over such a model will form the basis for the development of governance tools that can be used by First Nations and other interested parties, in the management of natural resources in northeastern BC.

WHERE IS THE RESEARCH BEING DONE?
British Columbia

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
John Innes

Researchers
John Nelson

251. A Systems Approach To Integrating Ecological, Economic, And Social Values Within The SFM Framework Developed For Riverside's TFL 49.

Project nelsonjsyst10

Start Date: June 1, 2004

WHAT RESEARCH IS BEING DONE?

Our project will establish a set of criteria and indicators (C&I) and a decision support system (DSS), to evaluate the TRIAD approach (i.e., zoning the land base for intensive forestry, extensive forestry, and protected areas) that Riverside Forest Products Limited has proposed for Tree Farm Licence (TFL) 49, near Kelowna, British Columbia. The C&I will be developed based on strategic planning at the coarse-filter level, supported by tactical (medium-filter) considerations, and implemented operationally, through a series of stand-level management options. Our specific objectives are to: 1. Identify and test ecological indicator species, focussing on birds and the stand and ecosystem characteristics that they favour; 2. Develop social indicators based on visible measures of stewardship, by using visualization techniques with local and non-local publics to test perception of zoning and management scenarios; 3. Identify and incorporate economic indicators for timber production, and estimate the economics of non-timber outputs; and 4. Develop and apply a DSS that can forecast impacts of stand-level management practices and landscape-level zonation strategies on the indicators, and help assess tradeoffs. A series of models used to project forest conditions and to track indicators will be integrated into the DSS. These include: (1) a stand-level ecosystem management model; (2) a forest-level model; (3) a zonation model; (4) a natural disturbance model (mountain pine beetle (Dendroctonus ponderosae)); (5) a road network model; (6) a habitat model; and (7) a suite of visual communication tools.

WHERE IS THE RESEARCH BEING DONE?
British Columbia

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
John Nelson

Researchers
Daryll Hebert, *John Innes*, *Hamish Kimmins*, *Karl Larsen*, *Mike Meitner*, *Rob Rempel*, *Stephen*

Sheppard, Ilan Vertinsky

250. Carbon Credit Trading: The Law, Firm Behaviour, Economics, And Landscape Impacts.

Project armstronggcarb10

Start Date: June 1, 2004

WHAT RESEARCH IS BEING DONE?

Our project will provide insights into effective policy options relating to forest-based carbon, through a combination of legal analysis, experimental economics, and landscape-level modelling. Legal analysis is required to understand how international agreements, the Constitution, and existing laws and treaties will influence carbon ownership and trading regulation. Specifically, we propose to analyze: 1. Ownership rights in forest-based carbon, and constitutional authority to regulate carbon trading, including an examination of First Nations' rights and authorities; 2. The Kyoto Protocol and the Land Use, Land-Use Change and Forestry sub-agreement, to assess the parameters they set for forest management and carbon; and 3. Legal dimensions of options for carbon-trading regimes and implications for forest management. We will investigate the incentives given by various institutional arrangements for the offset trading system, using economic experiments to explore the behaviour of agents. Some examples of the institutional rules that we may investigate are: (1) the determination of the baseline in credit allocation; (2) monitoring and verification; (3) liability; (4) the definition of permanence; and (5) market concentration. The experiments will use representatives from forest companies, First Nations, and agricultural landowners. Other issues concerning transactions costs and their impact on a carbon trading system can also be examined with this framework. We will project the impacts of alternative incentive systems on forest landscapes, using models integrating forest growth, management, and disturbance. Unintended impacts of carbon-related incentives on other forest values, such as recreation and biodiversity, will be taken into account. The modelling component will be linked with Canadian Forest Service (CFS) carbon modelling efforts. The results of this linkage will enter into national policy discussions regarding carbon management through CFS, and will inform our Aboriginal, industrial, and government partners about the implications of carbon management schemes. This project is funded under the Sustainable Forest Management Network/BIOCAP Canada Foundation Joint Venture Agreement.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Glen Armstrong

Researchers
Vic Adamowicz, Stewart Elgie, Paul Thomassin

249. Commercial Development Of Non-Timber Forest Products And Forest Bio-Products: Critical Factors For Success.

Project mitchelldcomm10

Start Date: June 1, 2004

WHAT RESEARCH IS BEING DONE?

Our project will develop and apply a framework for: 1. Determining a community's criteria for successful commercial development of non-timber forest products (NTFPs); 2. Identifying key factors that influence the likelihood of success; and 3. Identifying key factors that influence the impact of NTFP commercialization on forest environments. Our team will undertake a comprehensive analysis of the policy and legislative framework for NTFPs and bio-products in Canada, and build a searchable database of NTFP and bio-product development cases in North America. We will use the results of our analysis to develop approaches to: 1. Assist Aboriginal and rural communities in determining when and how to proceed with commercial development of NTFPs and/or bio-products; and 2. Assist decision-makers in determining appropriate policy initiatives for the management, production, and marketing of NTFPs.

WHERE IS THE RESEARCH BEING DONE?
Canada-wide

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Darcy Mitchell

Researchers
Glenn Fox

248. Cooperative Learning For Integrated Forest Management: Building A C&Amp;I Framework For The Whitefeather Forest Initiative, Northwestern Ontario.

Project davidsonhunticoop10

Start Date: June 1, 2004

WHAT RESEARCH IS BEING DONE?

In this project, we will undertake a cooperative learning process with Pikangikum First Nation elders, to learn about the signs and signals of forest ecosystem change, and to build a harmonized criteria and indicators (C&I) framework, in support of community-based land-use planning and management in northern boreal forests. Our research will be guided by 4 key questions: 1. How do indigenous people draw upon signs and signals to create an understanding that a forest ecosystem is moving toward a desirable or an undesirable state?; 2. Can informal signs and signals of ecosystem change provide the basis for a dialogue to develop a harmonized C&I framework, for cross-scale and pluralistic systems of natural resource governance?; 3. Can the development of a harmonized C&I framework lead to the shared perception and meaning of ecosystem change, and the basis of an information system for adaptive community-based resource management?; and 4. What is the First Nation experience in deriving C&I frameworks based upon their knowledge, values, and institutions, as opposed to adopting frameworks developed by others? Our specific objectives are to: 1. Identify and document signs and signals that can be utilized to monitor changes in boreal forest ecosystems, using the cooperative research framework developed by Davidson-Hunt, in his work with Ojibway non-timber forest product (NTFP) users; 2. Document signs and signals in the field with Ojibway elders and trappers, to build a harmonized C&I framework for integrated management of the Whitefeather Forest Planning Area (WFPA); and 3. Assess the state of knowledge, and integrate lessons learned from First Nation experiences with C&I processes.

WHERE IS THE RESEARCH BEING DONE?
Ontario

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Iain Davidson-Hunt

Researchers
Fikret Berkes, *Alex Peters*, *John Sinclair*, *Michael O\'Flaherty*

247. Effects Of Landscape Composition And Pattern On The Abundance And Fitness Of Wildlife Indicator Species At Multiple Scales: Do Thresholds Exist?.

Project boutinseffe10

Start Date: June 1, 2004

WHAT RESEARCH IS BEING DONE?

Our project will assess the response of focal wildlife species and assemblages across a broad range of landscape conditions, through a combination of field studies and spatio-temporal modelling. The results will provide empirical data to evaluate some of the fundamental principles of landscape ecology that are being applied in sustainable forest management (SFM) strategies, and to improve objective setting and monitoring of landscape targets within SFM plans. Our team is uniquely positioned to conduct this research because: 1. Epidemic insect attack and associated timber harvesting is creating a gradient of habitat composition and pattern within our study area, effectively providing a natural landscape experiment; 2. There is extensive baseline inventory and research information available that will serve as a foundation for this research (including a sample of 150 Northern Goshawk (Accipiter gentilis) territories, and a developed spatio-temporal model); and 3. We are using strategic and operational SFM plans being developed by industry, government, and the public, to direct the research questions being asked (to ensure the research is operationally relevant), and to structure the delivery mechanisms of the research outcomes (to ensure our results are operationally applicable).

WHERE IS THE RESEARCH BEING DONE?
British Columbia

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Stan Boutin

Researchers
Andrew Fall, *Mike Gillingham*, *Karl Larsen*, *Don Reid*, *Doug Steventon*, *Kari Stuart-Smith*, *Carl vanderMark*

246. Landform-Based Hydrologic Indicators Of Disturbance In Heterogeneous Landscapes: Water Cycling In Relation To Disturbance In The Western Boreal Forest.

Project devitokland10

Start Date: June 1, 2004

WHAT RESEARCH IS BEING DONE?

Our project aims to: 1. Develop a hydrogeologic framework to define landscape units that control the storage and movement of water in the Western Boreal Forest (WBF); 2. Determine

the best model structure to predict hydrologic response to land disturbance, given the variability of the region's climate and landforms; and 3. Provide a tool to evaluate the effectiveness of riparian areas in ameliorating water quantity and quality impacts of forest activities, at varying scales over a Forest Management Agreement (FMA) area. We will use a combined field studies-modelling approach. This will allow us to assess the spatial and temporal scales at which hydrological responses (wetland and groundwater levels, stream peak, base flows, etc.) to disturbance (fire, harvesting, etc.) will occur. The models developed through this research can be coupled with our partners' Geographic Information System (GIS)-based forest management practices (FMPs), and used to define appropriate criteria and indicators (C&I) of change. The models can also be used to evaluate cumulative watershed effects (CWE) of land management scenarios, on water quantity and quality.

WHERE IS THE RESEARCH BEING DONE?
Alberta
British Columbia
Manitoba
Saskatchewan
Yukon

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Kevin Devito

Researchers
Thian Gan, *Dennis Gignac*, *Carl Mendoza*, *Rich Petrone*, *Uldis Silins*

245. Old-Growth Forests In Eastern Canada: Exploring Tradeoffs Among Timber, Biodiversity, Carbon, And Public Preferences.

Project duinkerpoldg10

Start Date: June 1, 2004

WHAT RESEARCH IS BEING DONE?

Our specific objectives are to: 1. Develop comprehensive ecological characterizations of OGF at both the stand and forest scales, in 2 study forests in Nova Scotia and Ontario, and assess the degree to which the OGF is now fulfilling (and might fulfill in the future) ecological functions associated with biodiversity and carbon cycling; 2. Determine how various citizen constituencies (e.g., rural people, urban people, and environmental advocates) perceive and value OGF and its management, in the 2 study forests; 3. Assess, in the 2 study forests, implications of alternative OGF management approaches for forest values associated with timber production, biodiversity, and carbon uptake and storage, and explore tradeoffs among the values, across the assessed management approaches; 4. Determine what management objectives and associated actions forest managers should apply to conserve OGF in their respective forests; and 5. Develop comprehensive, detailed, well-grounded, and implementable OGF management strategies that will satisfy both the forest managers' wood-supply needs, and their desire to conserve biodiversity. This project is partially funded under the Sustainable Forest Management Network/BIOCAP Canada Foundation Joint Venture Agreement.

WHERE IS THE RESEARCH BEING DONE?
Nova Scotia
Ontario

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Peter Duinker

Researchers
Tom Beckley, *Gary Bull*, *John Caspersen*, *Han Chen*, *Kevin Crowe*, *Graham Forbes*, *Eldon Gunn*, *Christian Messier*, *Liette Vasseur*, *Jian Wang*

244. Social Sustainability: Strategies For Definition, Measurement, And Management.

Project beckleytsoci10

Start Date: June 1, 2004

WHAT RESEARCH IS BEING DONE?

Guided by 3 workshops with designated themes and planned outputs, our project will focus on: 1. Defining social sustainability in the context of natural resource management; 2. Developing innovative measures for social sustainability; and 3. Interpreting the implications of these definitions and measures for resource managers. The workshops will involve researchers and resource managers from partner and other agencies, to help ensure that our research is relevant, and that we convey our results in ways that resource managers find useful and understandable. We plan to examine 3 aspects of social sustainability, mainly (but not exclusively) at the community level: 1. Governance (rights, responsibilities, decision-making, tenure, equity, and management authority); 2. Social structure and values (public perceptions, opinions of resource management (satisfaction, dissatisfaction, levels of knowledge, interest, etc.), and the ways in which forest values are distributed, communicated, and formulated); and 3. Adaptation and resilience (the ability to adapt positively to change). Results from our research will be made available through: (1) synthesis reports that summarize and translate findings from the social science literature into usable information for resource managers; (2) conceptual pieces that deal with the fundamental definition of social sustainability, and that may suggest new ways to approach the concept; and (3) empirically-based work that tries to demonstrate new tools and approaches to measure social sustainability.

WHERE IS THE RESEARCH BEING DONE?
Canada-wide

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Tom Beckley

Researchers
Luc Bouthillier, *Debra Davidson*, *Naomi Krogman*, *Mike Meitner*, *Solange Nadeau*, *John Parkins*, *Maureen Reed*, *Stephen Sheppard*, *Dave Tindall*

243. The Challenge Of Institutional Redesign: Tenure, Competitiveness, And Sustainability.

Project vertinskyichal10

Start Date: June 1, 2004

WHAT RESEARCH IS BEING DONE?

Our project will develop proposals and implementation strategies for new tenure arrangements

under which companies assume management responsibilities and other commitments, in exchange for access to timber on Crown land (land owned by the Canadian provincial governments). We will undertake our research in 3 phases: 1. We will review relevant literature and existing experiments with new types of tenure arrangements, to articulate a framework for the tenure systems. This framework will help identify key features of tenure systems and criteria for their evaluation, and provide the means for generating proposals for new tenure arrangements; 2. We will conduct a national survey and 9 comprehensive case studies that highlight critical issues associated with tenure systems, guided by the framework developed in Phase 1. The data from the national survey and the case studies will allow us to construct statistical models that can be used to evaluate and assess existing and proposed tenure systems (particularly with respect to their impacts on both the cost and availability of timber, and the provision of non-timber values), and to assist in the development of implementation strategies; and 3. We will use the evaluation and design tools devised in Phase 2 to develop proposals for institutional change and strategies for implementation, in regional workshops involving community, industry, and government decision-makers. One outcome of these workshops may be the implementation of experimental pilots in various provinces.

WHERE IS THE RESEARCH BEING DONE?
Canada-wide

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Ilan Vertinsky

Researchers
Luc Bouthillier, *Gary Bull*, *Peter Duinker*, *George Hoberg*, *Shashi Kant*, *Jamie Lawson*, *Marty Luckert*, *Darcy Mitchell*, *Marian Weber*, *Peggy Smith*, *G. Cornelis van Kooten*

242. A Static And Dynamic Analysis Of Forest Recreation Values At Risk.

Project boxallpstat8

Start Date: June 4, 2003

WHAT RESEARCH IS BEING DONE?

The direct and indirect economic value of nature-related recreation in Alberta in 1996 was worth over $1.4 billion. Thus, recreation activity is highly valued, and is an important component of the values at risk in the green area of the province. These economic values are well beyond the cost of replacing the provincial recreation infrastructure (e.g., provincial park facilities). Thus, the recreation values at risk include the levels of participation in activities, and their associated economic values. This project will investigate the relationship between forest fire management and forest-based recreation in Alberta. The main goal of the project is to provide information to improve the forest fire management policies and practices. The major objectives are to: 1. Enhance and expand the inclusion of recreation values in a provincial zoning scheme, or values-at-risk map (VARM); 2. Incorporate in such schemes the dynamic inter-temporal relationships between forest fires and recreation participation; and 3. Incorporate recreation values into return on investment (ROI) analysis of selected fire management activities. The project has 3 components. The first involves a static analysis of recreation values at risk, utilizing existing data from existing sources, such as the National Survey on the Importance of Nature to Canadians (1996), and Alberta Parks. This component will develop models of participation in forest recreation and the economic values of recreation in a spatially explicit framework, for incorporation into the VARM. The second component involves the development of models to understand how fire affects participation over future time horizons. This knowledge will allow

fire managers to use the VARM to project fire effects on recreation into the future, and thus incorporate fire and recreation dynamics into the allocation of fire management resources. The third component is to utilize the VARM and the dynamic models to examine returns on investments in some selected fire management activities (e.g., fire-smart forest management strategies).

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Peter Boxall

Researchers

241. Applying Avian Indicator Models In Forests Of Northeastern British Columbia.

Project bunnellfappl8

Start Date: June 4, 2003

WHAT RESEARCH IS BEING DONE?

Because forest planning covers large areas and long time periods, conservation of biodiversity in managed forests must employ models to assess the consequences of management activities. Models describing relationships between indicator species and habitat provide a cost-effective way to monitor biodiversity over large spatial and temporal scales. Moreover, models based on spatial habitat information, such as forest inventory data, facilitate assessments and predictions, and provide information at scales commensurate with forest management planning. Such models have recently been developed for songbirds in the boreal mixedwood forest of Alberta, and these will be adapted and validated for use within Canadian Forest Products Ltd.'s (Canfor's) tenure in northeastern British Columbia. Subsequently, these models will be used to evaluate the effectiveness of Canfor's management activities and strategies.

WHERE IS THE RESEARCH BEING DONE?
British Columbia

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Fred Bunnell

Researchers

240. Assessing Tradeoffs Between Timber And Non-Timber Values Within A Triad Zoning Framework (Riverside, Bc).

Project innesjasse8

Start Date: June 4, 2003

WHAT RESEARCH IS BEING DONE?

Forest management in Canada is undergoing major changes, as it moves from a logging-based industry to one that depends on the successful balancing of intensive and extensive forestry. In addition, growing pressure is being placed on government and industry to set aside land as permanent reserves. These changes have led some to suggest the TRIAD approach, which

involves dividing the land base between intensive forestry, extensive forestry, and protected areas. TRIAD methods are being considered, or have already been implemented, in various parts of Canada, but very few attempts have been made to see whether the aims will be achieved, namely to maintain or increase timber supply, while maintaining biodiversity values. This project will develop methods to examine and evaluate the tradeoffs involved in TRIAD, using the case of Tree Farm Licence (TFL) 49, near Kelowna, British Columbia (operated by Riverside Forest Products Limited). We will design tools (specifically, a decision support system) that can be used by forest managers and others to evaluate the benefits and problems associated with the TRIAD approach. Various planning scenarios will be developed, using the advanced forest planning and optimization techniques that have been developed primarily in North America. These will be evaluated using statistical methods recently developed in Europe, specifically for this purpose. The combination of Canadian, European, and US research and technology, and its application to an operational Tree Farm Licence in BC, provides unique opportunities for training, and for the application of state-of-the-art science to the complex planning issues associated with forestry in British Columbia.

WHERE IS THE RESEARCH BEING DONE?
British Columbia

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
John Innes

Researchers

239. Boreal Forest Riparian Bird Communities: Effects Of Local- And Landscape-Level Processes.

Project hobsonkbore9

Start Date: June 4, 2003

WHAT RESEARCH IS BEING DONE?

Our project will provide data that will be combined with previously-collected information from upland environments, to generate risk assessment models for boreal forest birds, at a regional scale. We will: 1. Provide baseline data for riparian bird communities, at a broad geographic scope, including study areas in 3 provinces: Alberta; Manitoba; and Saskatchewan; 2. Compare riparian habitats with differential degrees of human disturbance (roads, seismic, forestry, and agriculture), to address potential cumulative effects on the integrity of the riparian bird community; and 3. Compare riparian bird communities in shoreline areas subjected to wildfire and variable retention harvesting, in order to place our findings within the context of the natural disturbance paradigm, and to assist with the development of alternative approaches and guidelines for shoreline management.

WHERE IS THE RESEARCH BEING DONE?
Alberta
Manitoba
Saskatchewan

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Keith Hobson

Researchers

238. Canopy Closure, Structure, Species Composition, And Biodiversity: A Multi- And Hyperspectral Approach.

Project sanchezazofeifaacano8

Start Date: June 4, 2003

WHAT RESEARCH IS BEING DONE?

There is a clear understanding that future biodiversity monitoring programs in boreal ecosystems will need the support of remote sensing-derived information. This is especially relevant when the "change over time"; of a specific variable is introduced to those analyses aimed at quantifying changes to biodiversity, as a result of human activities. Thus, there is a strong need to develop and implement the capabilities of remote sensing hyperspectral and multispectral sensors at airborne and satellite platforms, to provide relatively quick, objective, and consistent estimates of land cover composition and structure (such as canopy species composition, canopy structure, and linear disturbance), at regional and national levels. Therefore, this project has the following objectives: 1. Seeing the trees for the forest: To study and develop remote sensing-based techniques that extract canopy species composition information from complex boreal landscapes, using 2 of NASA's satellites: Hyperion and Landsat Enhanced Thematic Mapper (TM 7 - ETM); and 2. Canopy architecture: To determine the effect of scale, ranging from field to satellite image, on the extraction of canopy architecture (defined by crown closure and leaf area index), for selected species in the boreal mixedwood of northeastern Alberta.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Arturo Sanchez-Azofeifa

Researchers

237. Climate Change Impacts On The Southern Boreal Forest: Past And Future Distribution And Productivity.

Project sauchyndclim8

Start Date: June 4, 2003

WHAT RESEARCH IS BEING DONE?

This project addresses a major gap in the study of Canada's forests. Most forestry research examines one aspect of climate change: the potential storage of carbon and mitigation of the effects of greenhouse gases. Our project instead deals with the impacts of climate change on forest productivity, and the adaptation to practices and policies that will be required to sustain the forest industry, with changes in climate and the distribution of the boreal forest. The study addresses a common weakness in climate change impact assessment: the uncertainty of forecasting future changes in climate and ecosystems. We will hindcast a model of forest productivity over the past millennium, calibrating the model using data on past climate, and verifying the results using data on past vegetation. This will require a history of the response of boreal forest ecosystems to the climate change and variability of the past 1,000 years. The source of this information will be tree rings, the pollen and plant macrofossils in lake sediments, and isotopes of carbon and oxygen in the sediments and trees. By validating a model of future forest productivity, we will be able to forecast, with greater confidence, the potential impacts of climate

change on forest productivity. The research results will be transferred to our industrial partner during the project, for planning the allowable annual cut (AAC) for a selected area in central Saskatchewan. We will hold a workshop to demonstrate the role of climate change impact assessment in the forestry sector.

WHERE IS THE RESEARCH BEING DONE?
Saskatchewan

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Dave Sauchyn

Researchers

236. Crown Density And Crown Closure In Relation To Stand Characteristics.

Project lieffersvcrow8

Start Date: June 4, 2003

WHAT RESEARCH IS BEING DONE?

The density of forest canopies is important because the amount of overstory foliage controls how much of the light energy can be captured for productivity of trees, as well as the amount of light transmitted to the forest floor. Transmitted light influences the productivity and biodiversity of understory layers. Up to this time, models of tree growth and competition in stands have worked on the assumption that in well stocked stands, crowns of trees will expand to fill all of the space between trees. While this concept appears to be correct for temperate forests, there is growing evidence that in boreal forest, taller and older stands develop empty space between crowns that is unavailable for foliage expansion. This "crown shyness" is likely related to the stand relative density, and the average tree height and the degree of slenderness of the boles. Slender boles (tall with narrow stems) will not have sufficient stiffness to hold the crowns rigid in wind. Collisions of crowns during wind, particularly during cold conditions, will result in breakage of branches, and a narrow tree crown. This will reduce tree vigour, and increase light transmission to the understory. Our objectives are to examine the amount of empty space within lodgepole pine stands, and secondly aspen stands, of different height, tree slenderness, and density. We plan to measure tree characteristics, using standard tree mensuration techniques (or data from permanent sample plots). We will also measure "crown shyness" and other crown characteristics, using photographs or light instrumentation (LAI-2000), or remotely, using air photos. Once we are able to predict the "crown shyness" from stand characteristics, we will use this to predict changes in growth and yield, using GYPSY or SORTIE. Also, models that predict light transmission through canopies (MIXLIGHT and SORTIE) can be refined to include development of "crown shyness" as a factor in their estimation.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Vic Lieffers

Researchers

235. Decision Support Systems For Flammable Wildland Urban Interface

Landscapes.

Project martellddeci8

Start Date: June 4, 2003

WHAT RESEARCH IS BEING DONE?

Our objectives are to work with fire management agencies in Alberta and Ontario, and a diverse group of ecologists, economists, sociologists, and psychologists, to: 1. Develop a spatially explicit fire occurrence prediction model, and couple it with a mechanistic fire spread model, to predict how fires will ignite and spread on a hypothetical wildland urban interface landscape that contains forest stands, fuel breaks, lakes, rivers, roads, communities, remote cabins, and other features that are characteristic of the boreal forest region of Canada; 2. Embed that flammable wildland urban interface model in a larger, comprehensive simulation modelling framework that can be used to specify integrated fire management strategies (e.g., prevention, fuel treatment, and building code impacts on structures), to predict the probability or risk that designated areas or structures will be burned during designated time intervals; 3. Work with ecologists and social scientists to develop methods for assessing the impact of fire on public safety and property, and link our decision support systems with the socio-economic models they develop, so fire managers can use the aggregate system to carry out comprehensive analyses of strategies for dealing with fire in wildland urban interface areas; and 4. Work with representatives of fire management agencies in Alberta and Ontario, to elicit from them their understanding of wildland urban interface fire behaviour and its social, ecological, and economic impacts, and to field test our decision support system.

WHERE IS THE RESEARCH BEING DONE?
Alberta
Ontario

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Dave Martell

Researchers

234. Developing Regional Biodiversity Indicator Models And Tools To Assess Forest Practices In Coastal British Columbia.

Project bunnellfdeve8

Start Date: June 4, 2003

WHAT RESEARCH IS BEING DONE?

Forest management activities and natural disturbances determine forest structures. Concerns about management activities have encouraged commitments by Canadian governments to sustainable forest management, and to development of a set of criteria and indicators (C&I) to assess progress towards that objective. National and provincial level C&I provide important context for regional activities, and links to global monitoring and reporting initiatives. Nonetheless, it is at the regional level that forest managers have a direct impact on current and future forest conditions, including habitat structures and species assemblages. It is thus important to select regional indicators that directly measure those ecological values most likely to be affected by management practices, and to track them in space and time. Moreover, by selecting biodiversity indicators that can be linked to spatial resource information (e.g., forest inventory data), it will be possible to monitor and forecast the effectiveness of alternative management

strategies, in a cost-effective and efficient way (adaptive management). The broad objective of this project is to develop biodiversity indicator models and tools to support more informed decisions by forest managers. Specific objectives are to: 1. Develop statistical models that relate selected biodiversity indicators to spatial resource information; 2. Develop a Geographic Information System (GIS)-based assessment tool that integrates indicator models, and can be linked to landscape simulation tools; 3. Evaluate biodiversity indicator models as new monitoring data are collected, and use models to target future validation sampling; and 4. Apply the biodiversity indicator models and tool to assess the effectiveness of Weyerhaeuser's forest management strategies.

WHERE IS THE RESEARCH BEING DONE?
British Columbia

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Fred Bunnell

Researchers

233. Effects Of Linear Features And Access On The Behaviour And Demographics Of Black Bears.

Project boycemeffe8

Start Date: June 4, 2003

WHAT RESEARCH IS BEING DONE?

Our objective is to address how unrestricted access by hunters to linear features in the landscape (roads, cutlines, etc.) affects black bear (Ursus americanus) behaviour and population dynamics. Black bears in northeastern Alberta are an important resource to the outfitting industry, recreational hunters, and First Nations people. Black bears are particularly susceptible to the level of access in the landscape, due to the practice of baiting, permitted throughout most of Canada. Hunters bait sites at regular intervals along access corridors to habituate bears, therefore increasing hunter success and selectivity for large trophy males. The role of adult males in population regulation is presently unclear, making it difficult to predict the potential long-term effects of increased hunter access. By selectively manipulating hunter access in hunted and unhunted study areas, we will isolate the effects of hunting, and quantify its effect on: (1) bear behaviour and avoidance of high human-use areas; (2) cub mortality; (3) sex- and age-specific habitat selection; (4) female nutritional condition; and (5) reproductive rate. This large-scale experiment is the first of its kind, and will provide data to support simulation models predicting the effects of access and hunting on bear populations. This research is part of a larger cooperative study that will integrate knowledge from several related studies addressing the effects of linear features, to produce a simulation modelling framework capable of evaluating alternative access management scenarios. With the present rate of encroachment into the landscape, such tools will be essential to ensure future ecosystem integrity.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Mark Boyce

Researchers

232. Evaluation Of The Buffering Role Of Wetlands In Different Landscapes Of The Western Boreal Forest.

Project devitokeval8

Start Date: June 4, 2003

WHAT RESEARCH IS BEING DONE?

Presently, the buffering role of wetlands represents a significant gap in knowledge in the modelling of impacts of timber-harvest practices on aquatic ecosystems in the Western Boreal Forest (WBF). The WBF is one of the largest forested regions in North America with abundant wetlands that are vital for biodiversity and waterbirds. How the lakes and ponds in this region respond to timber-harvesting disturbances cannot be extrapolated from research in other regions, such as the Boreal Shield, because of variation in climate and biogeographic setting. The research will examine the detailed biogeochemical processes of nutrient (N and P) transport and transformations in riparian wetlands, in relation to the ground water and surface water interactions between riparian wetlands (peatlands and marshes), near shore littoral zones, and gyttja (lake muds), in a range of hydrogeologic settings typical of the WBF. This information will be used to further develop a geologic framework, in order to generalize the relative role of riparian wetlands in influencing the water chemistry of freshwater systems throughout the landscape, and to implement adaptive management practices of riparian areas, to conserve pond water quantity and quality in this landscape.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Kevin Devito

Researchers

231. First Nations And Sustainable Forestry: Institutional Conditions For Success.

Project trosperrfirs9

Start Date: June 4, 2003

WHAT RESEARCH IS BEING DONE?

Our project will examine and evaluate the performance of the different institutional arrangements under which First Nations currently participate in the forestry sector, across Canada. We will: 1. Identify the appropriate criteria and indicators (C&I) by which Aboriginal communities measure the performance of those institutions; 2. Identify the essential characteristics of successful arrangements, and aid Aboriginal communities in developing the appropriate institutions that will help them best achieve their goals; and 3. Inform policy-makers in the development of forest management policies that can facilitate successful arrangements that satisfy economic, social, and environmental criteria.

WHERE IS THE RESEARCH BEING DONE?
Canada-wide

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator

Ron Trosper

Researchers

230. Forest Floor Response To Disturbance In The Boreal Mixedwood Of Alberta.

Project quideausfore8

Start Date: June 4, 2003

WHAT RESEARCH IS BEING DONE?

The successful development of sustainable management practices for Canadian boreal forests will depend on devising strategies to maximize the use of soil nutrient resources in these systems. Forest floor processes, and how they respond to disturbance, are a key component of site productivity, through their regulation of nutrient cycling patterns. Boreal forests are composed of a mosaic of stand types at various successional stages, and forest floor processes are expected to differ among stand types. Yet, very little is known about the interactive effects of stand type and disturbance on forest floor processes. The Ecosystem Management Emulating Natural Disturbance (EMEND) experiment provides us with a unique opportunity to examine the influence of partial harvesting practices on forest floor processes in the mixedwood boreal forest of Alberta. We will characterize indicators of forest floor processes, including nutrient availability, humus physical and chemical characteristics, and microbial community structure. Results will allow us to establish reference values of forest floor quality criteria, in a variety of stand types (ranging from aspen-dominated to white spruce-dominated stands). Furthermore, we will quantify the response of these quality criteria to various partial-cut harvesting practices, as well as to fire-induced disturbance. This work will help us determine threshold values for the amount of disturbance different boreal forest ecosystems can sustain, without losing their biodiversity and functional integrity. Altogether, the research will provide quantitative relationships between measurable forest floor properties and processes that will help develop better guidelines for the sustainable management of the boreal mixedwood forest.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Sylvie Quideau

Researchers

229. Influence Of Forest Management, Silviculture, And Pest Management On Carbon Sequestration.

Project macleandinfl9

Start Date: June 4, 2003

WHAT RESEARCH IS BEING DONE?

The objectives of our project are to: 1. Integrate carbon (C) budget and sequestration objectives into strategic forest management plans, by way of a case study; and 2. Quantify the effects of integrated pest management of several major insect pests, on defoliation, plant growth rate, and C sequestration. Using study areas in New Brunswick and Newfoundland, we will: 1. Estimate stand-level net C sequestration rates; 2. Establish procedures to calculate regional net C sequestration, based on actual forest management plans; 3. Relate defoliation by 4 major insect

pests to C sequestration; 4. Compare C sequestration in intensively-managed plantations and in precommercially-thinned stands, with and without major insect pests; and 5. Conduct scenario modelling analyses to evaluate integrated pest management effects on C, at the landscape level. This project is funded under the Sustainable Forest Management Network/BIOCAP Canada Foundation Joint Venture Agreement.

WHERE IS THE RESEARCH BEING DONE?
New Brunswick
Newfoundland and Labrado

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Dave MacLean

Researchers

228. Innovative Methods For Chain-Of-Custody Tracking Of Certified Forest Products.

Project mcfarlanepinno9

Start Date: June 4, 2003

WHAT RESEARCH IS BEING DONE?

Our project will develop novel and patentable Chain-of-Custody (CoC) tracking technology that will: 1. Help link performance-based forest certification schemes to claims made by labelled products in the market place; and 2. Enable optimal management of products in mills that process certified and uncertified raw materials, or a variety of materials certified by different schemes. We plan to: 1. Review and critically analyze the current status of the CoC and labelling regulations; 2. Investigate mechanisms for ensuring scheme CoC requirements are met, including studying the feasibility of using in-line, real-time identification of certified and uncertified logs and processed materials, and examining the long-term potential for using specific markers that will enable the product to be traced from the forest to the market place; and 3. Undertake a mill-scale trial of the favoured CoC tracking system.

WHERE IS THE RESEARCH BEING DONE?
Alberta
British Columbia

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Paul Mcfarlane

Researchers

227. Linear Feature And Access Management Modelling And Scenario Analysis.

Project kurzwline8

Start Date: June 4, 2003

WHAT RESEARCH IS BEING DONE?

Development of simulation tools is a critical aspect of 3 important components of sustainable resource management: adaptive management; cumulative effects assessment; and integrated resource management. This project relates to development of modelling tools integral to an

adaptive management program that will evaluate effects of linear disturbances and access in northeastern Alberta. Further development of existing modelling platforms is an efficient alternative to development of new platforms, and 4 existing models will be utilized by this research: ALCES; FEENIX; TARDIS; and TELSA. They differ in their representation of space, and in the ecological processes each includes. They will be combined in a hierarchical framework, and used to evaluate future effects of linear feature and human access management strategies. Where modelling needs are not satisfied, development will add capabilities to appropriate models. This will include the integration of findings from research being conducted by the Adaptive Management Experiment (AME) Team, to determine the response of ecological components and processes to linear features and access. Following model validation, the framework will be used to identify best practices for linear feature and access management in northeastern Alberta. Workshops will present the framework, providing resource managers and stakeholders with an opportunity to evaluate and compare outcomes of alternative management strategies.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Werner Kurz

Researchers

226. Modelling Stand Level Response Of Montane Spruce Forests On Tfl 49 To Intensification Of Management.

Project kimminshmode8

Start Date: June 4, 2003

WHAT RESEARCH IS BEING DONE?

The world's population doubled between 1960 and 2000: an increase of 3 billion. The pressure that this poses for the world's forests requires the establishment of a new relationship between humanity and forests. There are many possible ways in which we could change forestry. One is to zone forests into different intensities of management, reducing pressure on less resilient forests, and increasing the flow of goods and services from more resilient forests. Within the southern interior of BC, the Montane Spruce (MS) Zone (which exists elevationally between the more sensitive Interior Douglas-fir and Engelmann Spruce-Subalpine Fir Zones) offers the potential for considerable increases in timber production, permitting reduced pressure on these less resilient lower and higher elevation zones. The best guide to change in forestry is experience. Unfortunately, we do not have rotation-length experience of the response of MS Zone forests of various types to different scenarios of intensification, and their interactions with bark beetle epidemics and possible climate change. These risk factors will affect decisions with respect to investment in intensification of management. Lacking experience, we can apply knowledge-based forecasting tools. Better still is to use tools that combine experience and knowledge. This project will modify FORECAST, an existing stand-level ecosystem management model that merges experience and knowledge, and will calibrate it for these MS Zone forests and risk factors. The forecasts will be used to drive landscape-level evaluations, and educational/extension tools to render the results accessible to the public.

WHERE IS THE RESEARCH BEING DONE?
British Columbia

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Hamish Kimmins

Researchers

225. Moose Cree Forest Knowledge Network.

Project tanneramoos8

Start Date: June 4, 2003

WHAT RESEARCH IS BEING DONE?

The research, with the Moose Cree First Nation of Ontario, will support the process of Aboriginal community planning for sustainable development, in the context of impending industrial forestry. It is designed to support, but be independent from, ongoing consultation processes that the Moose Cree First Nation of Ontario are now undertaking with the Ontario government, over forestry. While the research will be focussed on forestry, the work will also take account of other land uses, as well as the community values that would be relevant to these activities. It will entail the use of interviews and field site visits to document local knowledge of land use and the environment (using local Cree semantic concepts about landforms), and the implications that forestry has had, and may in the future have, for them. These data from the interview, as well as any other relevant existing data, will be digitized using Geographic Information Systems (GIS) mapping software, for which local people will be trained. The research will also include investigations into local Cree values attached to land and land-based activities. The analysis of these data, when combined with other information on forest resources and scientific forestry understandings, will be aimed at producing a number of development scenarios. These will allow the community to see the implications of various forestry development options.

WHERE IS THE RESEARCH BEING DONE?
Ontario

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Adrian Tanner

Researchers

224. Mortality Of Residual Trees In Mixedwood Cutovers.

Project lieffersvmort8

Start Date: June 4, 2003

WHAT RESEARCH IS BEING DONE?

Throughout Canada, forest managers are leaving residual trees in forest cutovers, with the idea that these trees will provide the biodiversity of the new stand with a legacy from the previous stand. These trees are expected to provide the living structural characteristics of the past stand, and eventually snags or coarse woody material, on the forest floor. Our observations on past cutovers show that in many cases, these residual trees die within a short time after logging. This may not be achieving the legacy objectives of the land managers. In this research, we hypothesize that water stress is the causal reason for this mortality. The work will examine which species are most likely to die, and which stand structural characteristics are most likely to result

in early death of these residual trees. Recent research on the water conducting capability of trees suggests that differences in xylem (wood) characteristics, such as size of the cells or the structure of the borders between cells, makes the wood vulnerable to bubble formation within these conducting vessels (cavitation). Once a bubble forms, this vessel can no longer conduct water. This causes water starvation to the top of the tree (even when there is ample soil water), and the eventual death of the tree. If the trees are sheltered from drying winds, it is likely that this phenomenon will not be as serious a problem. Our work will examine the water conducting status of the stem and upper branches of aspen, balsam poplar, and white spruce left in cutovers, compared to uncut control areas. We will also measure the relative humidity and vapour pressure deficit around the foliage of isolated trees, patches of trees, and in uncut control areas. The work will also examine mortality of these 3 species in juvenile mixedwood stands. It is proposed that on upland sites, drought intolerant species will be able to establish, but will suffer mortality during drought, after the time of crown closure (times of intense competition for water), before trees reach maturity. Knowledge of these processes will be critical in designing systems for maintaining residual trees in cutovers, and establishing meaningful regeneration standards for mixedwoods.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Vic Lieffers

Researchers

223. New Brunswick Triad Case Study: Assessing The Biotic Integrity Of Forest Reserves And Working Forest Of The Black Brook District.

Project villardmanewb8

Start Date: June 4, 2003

WHAT RESEARCH IS BEING DONE?

Biodiversity is one of several forest values that should be included in truly integrated forest management. For this purpose, we propose to develop an index that will provide a tool for managers to determine the status of forest biodiversity within their district. This index will be calculated from a subset of 14 potential indicators, including the density of large-diameter trees, the presence of species of birds of prey known to be associated with extensively-forested landscapes, etc. From these 14 indicators, we will select those that are: (1) sensitive to harvesting intensity; (2) correlated with many other elements or measures of biodiversity; and (3) relatively easy to measure, in a large number of sampling plots. Another product from this research will be the development of clear and efficient biodiversity sampling protocols that could then be integrated into standard company monitoring at permanent sampling plots. Research will be conducted in J.D. Irving, Limited's (JDI's) Black Brook District, a 190,000 ha private land base. We will establish at least 240 plots, distributed among scientific benchmark ("core") reserves, adaptive scientific reserves, and the "working landscape." When planning harvests and other silvicultural treatments, JDI forest managers will have the choice to refer to values of the index we will develop, or to those of any of the indicators used in its calculation. Index values will be provided as a database that can be updated by JDI staff. We will also produce maps of index values for the Black Brook District.

WHERE IS THE RESEARCH BEING DONE?

New Brunswick

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Marc-André Villard

Researchers

222. New Brunswick Triad Case Study: Harvesting Inspired By Natural Disturbance, Stand Structure Effects, And Scenario Planning.

Project macleandnewb8

Start Date: June 4, 2003

WHAT RESEARCH IS BEING DONE?

A TRIAD case study will be conducted on the J.D. Irving, Limited Black Brook District in northern New Brunswick. This 190,000 ha privately-owned land base includes some of the most intensively managed forest in Canada, with about 57,000 ha of plantations. The land base also includes: 49,000 ha of tolerant hardwood stands, managed for high quality veneer and sawlogs by selection and patch cut systems; over 7,000 ha of benchmark scientific reserves; and additional forest, either planted or extensively managed using natural regeneration. The landowner has successfully attained the International Organization for Standardization's Environmental Management System Standard (ISO 14001) and Forest Stewardship Council (FSC) certification (since voluntarily cancelled), and is near completion of Sustainable Forestry Initiative (SFI) certification. As part of this study, the industrial partner has committed to implement 2,600 ha of adaptive management treatments inspired by natural disturbance (primarily spruce budworm and gap replacement), and to assist in establishing a network of 240 permanent sample plots spanning reserves, adaptive management areas, and working forest. This will form the basis for TRIAD scenario planning analyses, and for studies of pre- and post-treatment response and between-treatment comparisons of stand structure. This project has been developed in conjunction with the J.D. Irving, Limited Forest Research Advisory Committee.

WHERE IS THE RESEARCH BEING DONE?
New Brunswick

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Dave MacLean

Researchers

221. Post-Fire Succession Of Insects And The Emend Fire History.

Project spencejpost8

Start Date: June 4, 2003

WHAT RESEARCH IS BEING DONE?

This research investigates the sequence of representative insects that use boreal mixedwood habitats after natural wildfires. Particular attention is given to beetles using leaf-litter and deadwood habitats in the first few years after a fire. Species using these habitats have been negatively influenced by boreal forestry, in northern Europe. Because those using deadwood are of long-term significance to ecological processes involved in nutrient cycling, they are of direct

functional significance, in addition to their indicator value with respect to natural disturbance. We also examine how litter-dwelling beetles and lepidopteran communities track changes in forest succession after wildfire. In this latter study, the fire history of the Ecosystem Management Emulating Natural Disturbance (EMEND) site will be established, and we will determine whether there is any relationship between the pattern of subsequent defoliator outbreaks, and the fire history of particular stands. The main significance of the work is expected to be: 1. Developing guidelines for post-fire timber salvage that protect biodiversity, and yet are sensitive to insect-caused timber damage; 2. Understanding the pattern of insect colonization in a large, naturally burned area (the Chisholm fire), in order to test the results of much smaller prescribed burns for scale effects; 3. Generating a fire history map for the EMEND project study site, to support subsequent interpretation of results from this long-term study; 4. Understanding the pattern of defoliator damage that can be expected in post-burn stands following a natural disturbance regime; and 5. Establishing an ecological benchmark for the pattern of litter-dwelling insect assemblages that can be expected over the life of stands following a natural disturbance regime, as required to support use of these species as indicators of sustainable forest management.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
John Spence

Researchers

220. Predicting Effects Of Intensive Forest Management On Aspects Of Biodiversity.

Project thompsonipred8

Start Date: June 4, 2003

WHAT RESEARCH IS BEING DONE?

Under the Lands for Life process and the Ontario Forest Accord, certain lands have been reserved for parks and other non-extractive uses. The result of this decision has meant that forest products companies will intensify their post-harvest silviculture activities to increase fibre yields, on an increased portion of the remaining productive lands. Intensive forest management (IFM) silviculture will change forest structures and stand composition, and result in truncated age distribution for more than 10% of the landscape. These changes may have implications for biodiversity within such stands and across landscapes, depending on the extent (in space and time) of the treatments. This study attempts to answer some questions about what the long-term effects of IFM on wildlife species might be. Preliminary aspatial modelling and a literature review suggested a number of possible impacts of IFM on stands and landscapes, and on certain vertebrate species. Hypotheses of effects based on individual species' responses from the models have been developed. The study design uses a nested approach for sites within stands (2 age groups), and stands within landscapes (2 types), to address the issue of scale. The project involves 2 parallel component studies, using the same study sites on areas where post-harvest silviculture was practiced intensively, starting about 30 to 40 years ago. The first would develop and model data on forest characteristics important to wildlife, including aspects of stand and landscape structures, and plant species composition. The second component is specific studies of wildlife responses to IFM, based on the likelihood of effects from the aspatial modelling of species that depend on those structures, including studies of habitat associations of moose,

snowshoe hare (Lepus americanus), a group of mid- to late-successional forest birds, and amphibians. For the selected species, summary information from the field studies, modelled spatially over time, would predict population changes (if any) as a result of IFM, through time and over large landscapes, and indicate long-term effects of increased use of IFM.

WHERE IS THE RESEARCH BEING DONE?
Ontario

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Ian Thompson

Researchers

219. Public Participation And Sustainable Forest Management: The Current State And Impacts Of Applications In Québec.

Project guaylpubl8

Start Date: June 4, 2003

WHAT RESEARCH IS BEING DONE?

Public participation has become an issue that cannot be ignored in forestry management. Nevertheless, we do not possess an overview that allows us to assess public participation experiences, or our overall state of knowledge. As many previous attempts to assess public participation processes have generally focussed on failures, we have not yet identified what the real impacts have been, and ways to measure them. This is particularly true for Québec, and this limits our ability to use to the full potential the acquired experience to date. This project will assess the state of development of public participation in forestry in Québec. Its objectives are to show how, and with which effects, public participation has become integrated into the management of public forest lands, and to illustrate the ways people rise to the challenges of public participation. We will: 1. Identify and analyze the processes in which public participation is integrated with institutions, procedures, mechanisms, and the functional regulations of public participation; 2. Undertake a critical examination of participation from the point of view of the participants, in the ways they participate, and the reasons they became engaged in the process; 3. Examine the scope and impacts of public participation processes, in terms of procedures, effectiveness, and adaptations; and 4. Assess the way different people react to the changing context and requirements of public participation processes.

WHERE IS THE RESEARCH BEING DONE?
Qubec

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Louis Guay

Researchers

218. Risk Management For Sustainable Forestry.

Project foxgrisk8

Start Date: June 4, 2003

WHAT RESEARCH IS BEING DONE?

Communities and firms that depend on harvesting timber are faced with significant uncertainties resulting from both market risk and production risk. Lumber prices, which are determined in global markets, typically exhibit significant volatility, due to swings in the world economy, changes in demand for wood products, the state of relations with our trading partners, and other factors. In addition, significant quantities of wood fiber are lost to fire and other environmental risks every year. This project will consider how forestry firms and communities that depend on timber harvesting can benefit from explicit recognition of uncertainty due to price and other risks, in forest management plans. If current levels of risk hedging are not optimal, there is an opportunity to increase forest productivity, through more flexible management plans. Finding better ways to manage the risks inherent in dealing in global markets and environmental uncertainties would promote greater security and stability for forestry firms, their employees, and the communities in which they operate. The project will develop models of the harvesting decision, using a real options approach to account for price and environmental risk. The results of the analysis will point to ways in which existing provincial regulations might hinder or enhance a firm's ability to respond to risk, and thus set the stage for future regulatory improvements that might be considered. The models will also be able to assist forestry firms to better manage their investments, in the face of risk.

WHERE IS THE RESEARCH BEING DONE?
Ontario

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Glenn Fox

Researchers

217. Scalable Indicators Of Disturbance (Sid): A Nested Approach To The Assessment Of The Cumulative Hydrological Impacts Of Forest Disturbance In Ontario.

Project buttlejscal9

Start Date: June 4, 2003

WHAT RESEARCH IS BEING DONE?

Our project will enable forest companies to incorporate hydrological principles into their management practices and assist them in obtaining certification of sustainability, by: 1. Developing criteria and indicators (C&I) for determining harvesting impacts on water quantity at varying spatial scales across forest landscapes; and 2. Producing a planning tool for predicting specific hydrological consequences of a given forest management plan in a particular landscape, as well as the cumulative effects of harvesting across spatial scales over longer timescales. We will use a combined monitoring-modelling approach, based on data from sites representing the major Ontario forest ecozones, to develop the capacity to predict cumulative effects of harvesting on streamflow across a range of spatial scales. Forest disturbance records at each site will be input to a Geographic Information System (GIS), enabling mapping of disturbance type, amount, location, and spread. Comparing these patterns to streamflow at various spatial scales at each site will identify if, when, and where harvesting has altered streamflow. Hydrologic modelling will also compare streamflow following disturbance to that expected under undisturbed conditions, and predict streamflow response to various harvesting strategies. Both approaches will identify the amount, type, and location of harvesting that causes significant changes in streamflow at each site.

WHERE IS THE RESEARCH BEING DONE?
Ontario

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Jim Buttle

Researchers

216. Social-Ecological Indicators For Community-Based Monitoring And Forest Resource Management.

Project berkesfsoci8

Start Date: June 4, 2003

WHAT RESEARCH IS BEING DONE?

The goal of the project is to examine sustainable forest management through research on social-ecological indicators of community and ecosystem health, in the Gwich'in Settlement Area, Northwest Territories. The growing body of local and traditional ecological knowledge (TEK) that has been documented over the last 2 decades has provided insights into the relationship that exists between indigenous communities and their environment. Land-based cultures require healthy ecosystems; hence, community health is closely coupled with environmental health. Until recently, the main emphasis of study has been in the area of environment and resource management; relatively little work has focussed on the social dimension of the human-environment relationship. This study will address this gap, by developing social-ecological health indicators based on local and traditional ecological knowledge, with particular attention to forest ecosystems and non-timber forest products (NTFPs). Research over the last several decades has shown that important opportunities exist for local communities, in resource and environmental management. Community-based resource management institutions, such as co-management boards, are useful examples of how communities can meaningfully participate in the management of local resources. For example, in northern Canada, the Arctic Borderlands Ecological Knowledge Coop and the Gwich'in Renewable Resource Board (GRRB) engage community members and their knowledge of local resources in the monitoring and management of wildlife, fisheries, and forestry resources. However, co-management boards often face challenges in addressing social, economic, and cultural issues in the management of biophysical resources. The study proposes to address this challenge, by examining how social-ecological indicators might be used in participatory resource management decision-making. The study will make theoretical contributions related to the use of multifunctional forest environments, and it will generate practical tools and indicators to address both community and environmental health issues. Designed to address both the priorities of the GRRB and the SFMN, these tools will help monitor social-ecological health, and assist in decision-making for sustainable forest resources.

WHERE IS THE RESEARCH BEING DONE?
Northwest Territories

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Fikret Berkes

Researchers

215. Structure And Function Of Boreal Forest Edges Across Canada: Towards

Natural Disturbance Management Of Edge Effects.

Project macdonaldestru8

Start Date: June 4, 2003

WHAT RESEARCH IS BEING DONE?

A sustainably managed forested landscape requires planning of the spatial configuration of cutover areas, including the location and form of cutblock edges (boundaries between cutover and uncut forest). Under natural disturbance-based management, we should create cutblock edges similar to those resulting from natural disturbance, in terms of structure, function, and landscape pattern. In this research, we will determine how the structure, composition, and function of fire edges compare to edges arising from harvesting, at both the stand and landscape levels. Subsequently, we will develop strategies and guidelines for creating edges that mimic those arising from natural disturbance. Our key research objectives are to: 1. Document structure and plant species composition of fire and cut edges, at the stand level; 2. Document the distribution and shape of fire edges on the landscape; 3. Compare fire and clearcut edges, in terms of key belowground processes: decomposition, nutrient availability, and mycorrhizal colonization; and 4. Examine the role of partial cutting, in creating edges that emulate fire edges. We will examine broadleaf-dominated forests in Alberta and mixedwood forests in Québec, so that our results will be applicable throughout the Canadian boreal forest. By comparing across ecosystems and regions, we can identify the nature of differences in edge influence, and predict edge width, in a variety of forest management areas of the Canadian boreal forest. Our results will also be applicable to efforts to quantify the amount of interior forest in a region, as compared to that under natural disturbance, as part of efforts to develop criteria and indicators (C&I). Finally, we will provide the scientific basis for design of harvest plans to create a new type of cut edge, for use in natural disturbance-based management.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Ellen Macdonald

Researchers
Yves Bergeron

214. Sustainable Forest Management Through Co-Management In Northern Ontario: Phase 2.

Project kantssust9

Start Date: June 4, 2003

WHAT RESEARCH IS BEING DONE?

Our project will examine processes related to the Northern Boreal Initiative (NBI) of the Ontario Ministry of Natural Resources (OMNR). The NBI covers the commercially-undeveloped area north of the Area of the Undertaking (AOU) for the Timber Class Environmental Assessment on Crown Lands in Ontario. Its goal is to provide First Nations located in the area with opportunities to take a leading role in community-based land-use planning and forest management, and to meaningfully incorporate their concerns about treaty rights, economic development, and Aboriginal rights, knowledge, values, and traditional uses. We will consider 3 aspects that need to be understood, for the NBI to succeed: 1. The context of forest management

partnerships in the area; 2. The outcomes of existing or previous forest partnerships between First Nations and the OMNR in the AOU, and the factors contributing to those outcomes; and 3. The overall expectations, priorities, and minimum requirements of the different parties, for potential partnerships evolving from the NBI. Participants in this project include 4 SFM Network Partners, Constance Lake First Nation, and Nishnawbe Aski Nation (NAN).

WHERE IS THE RESEARCH BEING DONE?
Ontario

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Shashi Kant

Researchers

213. Use Of Natural Disturbances And Natural Processes As A Template For The Sustainable Management Of Boreal Forests.

Project gauthiersuseo9

Start Date: June 4, 2003

WHAT RESEARCH IS BEING DONE?

The specific objectives of our project are to: 1. Assess the applicability of the eastern boreal natural disturbance-based management (NDBM) system general framework to other fire-driven regions; 2. Develop a better understanding of gap and patch dynamics; 3. Gain a better understanding of the interaction among disturbance types; 4. Develop a framework for an NDBM system for forests driven by secondary disturbances, such as insect outbreaks and natural tree mortality; 5. Develop, implement, and assess the ability of new silvicultural treatments to maintain targeted key indicators of sustainability (such as lichens), at stand and landscape levels; 6. Assess various practices or management scenarios, in terms of their effects on bird communities and sustainability; and 7. Build flexibility in NDBM, with regards to the effect of climate change on fire regimes.

WHERE IS THE RESEARCH BEING DONE?
British Columbia
Manitoba
Ontario

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Sylvie Gauthier

Researchers

212. Using Cavity Nester Biodiversity To Develop Indicators Of Forest Ecosystem Function And Resilience.

Project martinkusin8

Start Date: June 4, 2003

WHAT RESEARCH IS BEING DONE?

One of the key goals of sustainable forest management is retaining intact assemblages of forest wildlife. Our research focusses on components of avian biodiversity that can be used as

indicators of environmental impacts, and is designed to assist forest operators to implement improved ecologically-based forest practices. We relate forest stand composition and structural features to avian diversity in mixed and coniferous forests of interior British Columbia, with special attention to cavity nesting forest vertebrates. Cavity nesting communities are structured in nest webs, analogous to food webs, where ecological interactions are centred around nest site availability. In observational studies in old forests, cavity nesters exhibit a strong preference for nesting in unhealthy or dead aspen, near forest edges. Nest site resource flow through wildlife communities is strongly structured by availability of aspen, and ecological preferences of Northern Flickers (Colaptes auratus), the keystone excavator. Using data on avian abundance and reproduction and habitat attributes, for sites prior to and after experimental harvesting, we will assess how natural and anthropogenic disturbances affect key functional relationships, such as cavity nester biodiversity and productivity, across a range of forest stand types and disturbance conditions. We will develop criteria and test avian keystone species and resilience functions (our proposed forest ecosystem integrity indicators), across a range of forest ecosystems and natural disturbance types in interior British Columbia, and elsewhere in Canada. Our work will generate recommendations for maintaining or enhancing avian biodiversity across a range of natural variability, in several forest ecosystem types and silvicultural practices. Our proposed indicator models will have wide generality for Canadian forest ecosystems.

WHERE IS THE RESEARCH BEING DONE?
British Columbia

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Kathy Martin

Researchers

211. Windthrow Risk Modelling.

Project rueljcwind8

Start Date: June 4, 2003

WHAT RESEARCH IS BEING DONE?

Much research has been conducted on fire hazard and impact on forested ecosystems. However, windthrow can play a more important role in maritime ecosystems where fire return periods are long, and where winds can be rather severe. To be able to design management scenarios mimicking the natural disturbance patterns, it is necessary to reach a better understanding of this type of disturbance. The efforts of a national group of windthrow researchers will be combined to develop, validate, and refine empirical and mechanistic windthrow risk models, and provide a set of stand and forest level management strategies, for boreal and cool temperate forests subjected to long fire return periods. We will use the ForestGALES model as the conceptual process model into which we will incorporate our results. To be able to use the model in the Canadian context, we will expand the database on tree resistance to uprooting, and increase our understanding of the aerodynamic behaviour of our species, our stands, and our management regimes. The approach selected to model resistance to overturning is based on static tree pulling. We will measure wind profiles and drag on model trees in the large boundary-layer wind tunnel at the University of British Columbia, to better understand wind behaviour in our conditions. We will build predictive models for the McGregor Model Forest in British Columbia, and the Montmorency Forest in Québec. Field monitoring surveys for Québec and British Columbia will be used to construct empirical models of windthrow risk in unmanaged stands. These data will also be used to validate predictions of the ForestGALES adapted model.

WHERE IS THE RESEARCH BEING DONE?
British Columbia

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Jean-Claude Ruel

Researchers

210. An Assessment Of Economic Sustainability Indicators In A First Nations Context.

Project adamowiczvecon8

Start Date: June 3, 2003

WHAT RESEARCH IS BEING DONE?

Canada and the United States have recently implemented new guidelines or standards on industrial emissions of fine particulate matter. Recent assessments of these standards suggest that significant health benefits arise from reductions in particulate matter levels. While industrial sources are being regulated, there appears to be little research on the economic and human health effects of particulate matter from forest fires. In Canada, the largest source of fine particles is from "open sources" (72%), to which forest fires contribute 38% (Environment Canada, 2000). Approximately a third of Canadian PM2.5 emissions arise from forest fires, an amount equivalent to that from industrial sources. This project will investigate the relationship between forest fire management and the economic benefits of air quality improvements. The project has 2 components. The first component will develop an information base and set of tools that can be used to construct measures of the return on investment (ROI) of fire management activities, as they pertain to changes in human health risks and air quality. This is only one piece of the ROI puzzle, and it must be assessed along with information on the returns in other categories (property, timber, etc.), as well as the unintended consequences (or negative returns) arising from fire management activities (wildlife habitat, biodiversity, increased future fire impacts, etc.). The second component of the project is to include air quality and human health considerations in a zoning scheme, or values-at-risk map (VARM). This will involve linkages between models of fire behaviour, air emissions, human health, and economics.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Vic Adamowicz

Researchers

209. Approximating Values At Risk From Wildfire Using Shadow Prices.

Project armstronggappr8

Start Date: June 3, 2003

WHAT RESEARCH IS BEING DONE?

Forest fire puts many of the values provided by a forest at risk of destruction. Fire management agencies spend a considerable amount of money fighting wildfires and managing the landscape

to minimize the negative effects of fire. These agencies face increasing pressure to justify expenditures, using a return on investment (ROI) framework. The management plans for many forest management areas are developed with the aid of linear programming (LP) based forest activity scheduling models. A standard output of these models is the marginal contribution of each hectare of each forest type to the management objective specified for the forest. These marginal contributions are known as shadow prices. These shadow prices can be viewed as the cost of losing a hectare of a forest type to wildfire. By definition, these shadow prices are applicable to small changes in area, for a single timber type. Despite the fact that fires often cause large changes in the area of many timber types, preliminary work by Armstrong and Cumming indicates that shadow prices may provide good estimates of costs, across a large range of fire sizes. This project will build on this previous work, by systematically exploring the applicability of the shadow price approximation to evaluation of the costs of wildfire. A major element of this research project will involve the linkage of cost estimates developed to a Geographic Information System (GIS)-based values-at-risk map (VARM). This VARM will provide information to a fire management agency, which will help guide fire fighting and land management decisions.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Glen Armstrong

Researchers

208. A Bioregional Assessment Of Sustainable Forest Management For The Boreal Plains.

Project schmiegelowfbior9

Start Date: June 2, 2003

WHAT RESEARCH IS BEING DONE?

Our project will provide direct input into integrated resource management (IRM) initiatives currently underway in western Canada, by developing and examining alternative IRM policies for the Boreal Plains ecozone, using a scenario modelling approach. The basic modelling framework we will use includes dynamic representations of human behaviour, the ecological system, and the socio-economic system. We will construct integrated indicators of economic and ecological sustainability, and use these indicators to evaluate the outcomes of alternative policies. We will use this modelling framework to examine the effects on ecological and economic sustainability of: 1. Setting ecological and/or economic objectives, at different forest management scales; 2. Alternative land tenure arrangements; 3. Alternative biodiversity conservation strategies; and 4. Alternative incentive structures for carbon sequestration and land use rights. This project is partially funded under the Sustainable Forest Management Network/BIOCAP Canada Foundation Joint Venture Agreement.

WHERE IS THE RESEARCH BEING DONE?
Alberta
British Columbia
Saskatchewan

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Fiona Schmiegelow

Researchers

207. Role Of Pest Management In Sequestering Carbon In The 2008-12 Kyoto Commitment Period: Integration With Cbm-Cfs3 And Economic Analyses.

Project lantzvrole10

Start Date: June 1, 2003

WHAT RESEARCH IS BEING DONE?

Our project will address the potential for insect management (primarily the use of insecticides) to contribute to measurable carbon stock changes in forests, during the 2008-12 Kyoto Commitment Period. Our specific objectives are to: 1. Evaluate the impact of insect outbreaks on forest carbon dynamics from 2008-12, and determine the influence of pest management on forest carbon dynamics. We will use the Spruce Budworm Decision Support System (SBW DSS), integrated with the Carbon Budget Model for the Canadian Forest Sector (CBM-CFS3), to: (1) project carbon (C); (2) determine the marginal benefit of insecticide spray programs on timber volume, biomass, and carbon; and (3) evaluate current outbreak status and population forecasts of various pests in a number of Canadian provinces, from 2008-12; 2. Assess the cost-effectiveness of investing in pest management activities for forest carbon sequestration. We will use regression analysis to determine the factors that affect the marginal cost of a forest pest aerial spray program, and compare the cost estimate to other program options; and 3. Explore long-term costs and benefits of an institutional arrangement, whereby carbon credits are purchased by companies, and the revenues used for pest management activities. This will involve a combined sensitivity analysis of the SBW DSS, and a full cost-benefit analysis of protecting the susceptible forest from an outbreak. This project is funded under the Sustainable Forest Management Network/BIOCAP Canada Foundation Joint Venture Agreement.

WHERE IS THE RESEARCH BEING DONE?
New Brunswick
Ontario
Saskatchewan

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Van Lantz

Researchers
Barry Cooke, *Werner Kurz*, *Kevin Porter*, *Dave Davies*, *Denise Moranville*, *Walter Emrich*

206. Professional Forester Certification In The New Millennium.

Project krogmanprof8

Start Date: March 28, 2002

WHAT RESEARCH IS BEING DONE?

The purpose of the project is to describe Canadian professional foresters' attitudes and beliefs in regards to the appropriateness of their undergraduate forestry training and continuing educational opportunities, particularly around public involvement and Aboriginal consultation, for their current work situations.

WHERE IS THE RESEARCH BEING DONE?
Alberta
British Columbia
New Brunswick
Newfoundland and Labrador
Nova Scotia
Ontario
Qu&#65533;bec

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Naomi Krogman

Researchers
Peggy Smith

205. Implementing And Testing Decision-Support Tools To Evaluate Forest Management Scenarios For SFM: A Multiple Scale And Perspective Approach.

Project messiercimpl10

Start Date: November 30, 1999

WHAT RESEARCH IS BEING DONE?

In this project, we will assemble a "Sustainable Forest Management (SFM) Toolkit," composed of different modelling tools that are available now, are nearing completion, or can be developed rapidly. In conjunction with this modelling Toolkit, we will develop a generalized framework designed to: 1. Identify the key drivers of change and their associated scale, in different ecological and socio-economic settings; 2. Assign the appropriate tool(s) from the Toolkit, to model the drivers and their interactions; 3. Take advantage of local "domain experts," to rapidly parameterize and calibrate the tools to the new location; and 4. Design scenarios that will simulate the relevant range of management options, and evaluate their effect on forest landscapes, relative to desired future conditions. To evaluate the generality of our approach, we will apply our framework to 7 landscapes that represent diverse ecology, socio-economics, and management history, in Canada, Finland, and the United States. These applications will provide validation of our SFM Toolkit and modelling framework, and allow us to address some key research questions that will advance sustainable forest management in each region.

WHERE IS THE RESEARCH BEING DONE?
British Columbia
Newfoundland and Labrador
Ontario

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Christian Messier

Researchers
David Coates, *Peter Duinker*, *Andrew Fall*, *Marie-Josée Fortin*, *Dan Kneeshaw*, *Timo Kuuluvainen*, *Pierre Lasserre*, *Brian Sturtevant*, *Frédérik Doyon*, *Martin Landry*, *Jean Girard*

204. Keystones And Functional Indicators For Sustainable Forest Management, With Special Emphasis On The Cavity Nesting Community.

Project hannonskeys10

Start Date: November 30, 1999

WHAT RESEARCH IS BEING DONE?

Our project will identify a set of avian indicator species that represents important ecological functions in the boreal forest, and is sensitive to changes in forest structure and function. These indicators may be used to: 1. Determine the ecological benefit of best practices by industry; 2. Assess the value of protected areas; and 3. Enhance monitoring efforts, at several spatial scales. We will attempt to identify important functional indicators or keystone species in the cavity-using community, and characterize nest webs in 2 forest seral stages that are most likely to be affected by logging: old forest and young post-fire stands. One outcome of this research will be the development of methods to survey primary cavity producers, in a cost-effective and repeatable way. To ensure our research is relevant both now and in the future, we plan to conduct our analyses of impacts of harvesting using 2 new types of harvesting: aggregated harvest, and partial harvesting in riparian buffer strips. Our work on the aggregated cuts and partial harvest areas will allow us to suggest what types of trees to leave, and how big patches should be on harvested blocks.

WHERE IS THE RESEARCH BEING DONE?
Alberta
Saskatchewan

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Susan Hannon

Researchers
Eric Butterworth, *Brian Christensen*, *Elton Dzus*, *Samantha Song*, *John Stadt*

203. Hydrologic Regulation Of Ecological Dynamics Within A Forested Drainage Basin: A Pilot Study.

Project creedihydr7

Start Date: July 16, 2001

WHAT RESEARCH IS BEING DONE?

Forest substrate conditions, particularly the water content of organic and mineral soils, influence the potential for fire. In turn, following a fire, the substrate conditions will influence what forest species will regenerate. Substrate conditions are largely determined by local climatic conditions, as they influence local edaphic factors by in situ energy/water cycling, physical and chemical weathering processes, and geomorphic sediment production and transport. Both climatic normal (long term, 30 year averages) and climatic anomalies (short-term, weekly-monthly periods of extreme wet or dry conditions) need to be generated for comparison with biotic responses. Our general objective is to adapt an existing distributed model for application to the boreal forest that will be used to simulate abiotic and biotic controls on the hydrology and ecology of forest landscapes. Our specific objectives are: 1. To calibrate and corroborate a distributed model, called the Regional Hydro-Ecological Simulation System (RHESSys), for a "pilot" drainage basin in the boreal forest. 2. To use the model to establish the long-term, landscape scale (25 m to 50 m grid resolution) patterns in substrate (organic and mineral soil water content) conditions for use in explaining forest patterns and primary productivity. 3. To use the model to anticipate the potential impacts of disturbances to the patterns described in Objective 2. This will be cascaded through the model to develop effects on (a) potential and actual primary production of the dominant forest species; and (b) the hydrologic behavior focusing on spatial patterns of soil moisture, runoff regime and streamflow. The pilot study will demonstrate that the models are capable of capturing the hydrologic and ecologic processes at the scale indicated and will articulate links between the scientific findings and management implications.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Irena Creed

Researchers
Lawrence Band

202. Nutritional Indicators For The Maintenance Of Boreal Forest Productivity.

Project fylesjnutr7

Start Date: June 29, 2001

WHAT RESEARCH IS BEING DONE?

Nutrients and nutrient cycling processes play an important role in the sustainable production of the goods and services society has come to expect from forests. Forest management can affect nutrient status and nutrient cycling, known collectively as forest nutrition, and thus influence future productivity. However, the effects of forest harvesting, site preparation and stand tending on nutrition and future tree production are poorly understood. Easily measured indicators that reflect underlying nutritional conditions are required to monitor management effects and to

compare them to natural conditions. The goals of this research are to identify a set of indicators that can be used to assess the nutritional status of Canadian boreal forests and to produce a knowledge base that will allow managed sites to be compared to unmanaged forests and indicators to be interpreted in terms of underlying nutritional conditions and their potential to affect long term productivity. The research will result in the production of a handbook, aimed at practitioners, describing the indicators of forest nutrition, their application and the background knowledge required for their interpretation.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
James Fyles

Researchers
Robert Bradley, *Suzanne Brais*, *B. Côté*, *Alison Munson*, *David Paré*

201. A Dynamic Model Of Driftwood Flow Along The Lower Mackenzie River: An Alternative Timber Supply For Remote Northern Communities.

Project weinradyn7

Start Date: April 1, 2001

WHAT RESEARCH IS BEING DONE?

Culturally, northern peoples have long used driftwood found along northern flowing rivers and on the shores of Arctic Islands. Ecologically, the value of driftwood is not well studied, so the consequence of driftwood removal is unclear. Economically, there is increasing interest in this driftwood because of rapid community development and increasing use in the expanding petroleum industry. If riverside forests are cleared upriver or the driftwood inventory is removed upriver, the lower communities will lose this annual supply of wood and suffer economic hardship. The general objective of this research is to quantify the temporal budget and to test hypotheses for production, movement, decomposition and use of driftwood logs along the major rivers in the Gwich'in Settlement area. To meet this objective, we will survey community elders to understand how driftwood is harvested and how many logs were harvested historically and at present. We will use remote sensing techniques to quantify the inventory of riverside trees, the rates of bank erosion and the inventory of logs on the riverbanks. We will estimate rates of log movements using river hydrology data and mark-recapture approaches, and we will estimate rates of decomposition of the logs by field sampling. All of the above data will be used to build a model of driftwood changes over time and space. Using this model, we will be able to predict the economic value of small-scale harvesting to communities, and provide a budget for the use of driftwood logs. Although there is some enthusiasm for using larger quantities of driftwood, the flow of logs may be much lower than anticipated and the use of driftwood may need to be moderated in order to provide a sustainable harvest.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Ross Wein

Researchers
David Anderson, *Peter Boxall*

200. A Framework For Assessing Climate Change Adaptation Options For The Forestry Sector In The Prairie Provinces: A Case Study Of LP Corp, Manitoba.

Project johnstonmafra7

Start Date: April 1, 2001

WHAT RESEARCH IS BEING DONE?

Climate change is projected to affect ecosystems in central and northern Canada to a greater degree than in many other regions. Particularly vulnerable are areas of transition, e.g., between grasslands and forest. In the Prairie Provinces, the location of this boundary has been shown to be determined by moisture availability. If, as expected, climate change brings changes to precipitation and evaporation, then the boundary is likely to shift with attendant changes in species composition and forest growth rates. The majority of forest management is currently carried out near this transition zone, and will be severely affected if these changes occur. Forest managers need information about these impacts specific to their land base and presented at appropriate temporal and spatial scales. The objectives of this study are: 1. To develop an analytical framework for the forest industry that will enable them to identify climate change impacts and their adaptation options; and 2. To use LP Corp. as a case study environment in which we can apply this framework to their land base and operations in order to determine both climate change impacts and the options available to them for adapting to these impacts. The case study will include analyses of: a) The ways in which climate change is likely to affect the ecosystems comprising LP's land base; b) The vulnerability of LP's operations to climate change impacts; and c) The adaptation options available to LP given these impacts and the nature of the company's operations.

WHERE IS THE RESEARCH BEING DONE?
Manitoba

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Mark Johnston

Researchers

199. A Study To Determine The Effects Of Commercial Thinning On Songbird Habitat And Use In Fire Regenerated Lodgepole Pine Stands.

Project beckjastu7

Start Date: April 1, 2001

WHAT RESEARCH IS BEING DONE?

This project will examine the effects of commercial thinning practices on migratory songbirds' habitat and their use of pure lodgepole pine stands of fire origin. The objectives of this study are to: 1) Develop an understanding of the effect of this management practice on songbird habitat attributes, including removal of vertical structure, recruitment of coarse woody debris, and influence on residual vegetation; 2) Develop an understanding of the influence of the thinning treatment on songbird species richness and species abundance in treated stands; 3) Begin development of an understanding of the timeframe in which these stand changes occur and the response to the change by songbird species in treated stands using data from the control, treatment and historical study sites; 4) Provide the results of the effects of commercial thinning on

songbird habitat attributes and use to forest managers operating in this stand type; and 5) Provide an avian and vegetative data set that can be used for continued studies. Currently, there is a lack of information regarding songbirds in the fire regenerated pure pine stands of Alberta's Foothills. Lodgepole pine stands are a highly utilized cover type by provincial forest tenure holders. These stands often establish at densities that exclude utilization until natural thinning has occurred. Intensive forest management treatments such as commercial thinning allows for a merchantable component of the resource to be extracted while promoting intensified growth of the final crop trees. The commercial thinning process although intensive leaves a residual stand that maintains many natural characteristics. These residual stands will continue to be used by migratory and resident songbirds. It is unknown what the effect of this treatment is on migratory songbird's habitat and use of the stands.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Jim Beck

Researchers

198. Alberta Forest Management In The Public Sphere: A Province-Wide Case Study Of Public Advisory Groups.

Project davidsondalbe7

Start Date: April 1, 2001

WHAT RESEARCH IS BEING DONE?

This project is designed to critically examine the effectiveness of public advisory groups in Alberta. Building on previous survey research and a review of public involvement mechanisms in the Foothills Model Forest, this study will use a case study approach to examine public advisory groups on a province-wide basis, and situate these cases within the larger socio-political climate of forest management in Alberta. We will take a focused look at the activities of several public advisory groups throughout the province, documenting agenda-setting activities such as forest management problem identification and dispute resolution procedures. In addition, we will begin to address the extent to which public advisory groups, as a mechanism for public representation, act as an effective tool for public involvement and how well the concerns of local and non-local publics are incorporated into the decision making process. Subsequently, we will develop a survey instrument to address some of the hypotheses developed during the first phase of research. This phase will attempt to link theoretical assumptions about the ideal functioning of advisory groups to on-the-ground advisory group activities and individual group member perspectives. This work will allow us to: 1) Quantify some of the general strengths and weaknesses of public advisory groups, as well as identify variables that differentiate between "successful" and "unsuccessful" groups; 2) Provide a strategy for enhancing advisory group processes; and / or 3) Recommend alternative forms of public participation. Over the course of this project, we will address several important dimensions of the SFM public involvement theme area. In our efforts to evaluate the effectiveness of public advisory groups in Alberta, we will deal with several related theme areas such as accountability and trust, indicators of effective public involvement, identifying who the public really is (local versus non-local; urban versus rural; stakehol

WHERE IS THE RESEARCH BEING DONE?

Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Debra Davidson, **Richard Stedman**

Researchers

197. Assessing Impacts Of Fire In Boreal Forest Ecosystems.

Project armstronggasse7

Start Date: April 1, 2001

WHAT RESEARCH IS BEING DONE?

Forest fire is one of the most important agents of disturbance in the Canadian boreal forest. To some extent, the amount and location of fire on the landscape can be controlled through fire-fighting activities such as initial attack and sustained action, and through forest management activities (e.g., prescribed burning, harvesting, thinning, etc.) that change the vegetation cover (i.e., fuel type) of areas of forest. Frequently, however, fire suppression strategies are often developed without an understanding of the potential impact of fire management on the broad spectrum of forest values. This research project will provide a foundation for the development of the Network's research program in this priority area. Ultimately, the research will be geared toward a synthesis of existing knowledge about the values that may be affected by forest fires, and to develop a framework for simultaneously examining forest management and fire suppression strategies in the context of these forest values. This framework should allow for improved communication between forest management and fire suppression agencies, and allow for improved allocation of fire management and fire suppression resources. This project will contribute to the development of this framework in the coming year through an assessment of the needs of fire and forest managers and other end users of the project's outputs. Workshops and consultation with partners will facilitate "values at risk" research in the coming years.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Glen Armstrong

Researchers
Vic Adamowicz, *Peter Boxall*, *Grant Hauer*, *Kelvin Hirsch*, *Victor Kafka*, *Jay Malcolm*, *David Martell*, *Robert McAlpine*, *Fiona Schmiegelow*, *Uldis Silins*, *Cordy Tymstra*

196. Can Forest Management Safely Emulate Natural Disturbances And Landscape Patterns In Shoreline Forests?.

Project mallikacanf7

Start Date: April 1, 2001

WHAT RESEARCH IS BEING DONE?

In Ontario's boreal forest, neither the natural disturbance regime in riparian areas, nor the fate of shoreline buffer strips preserved during timber management have been quantified. This research is part of a multi-sector collaborative program designed to reduce this uncertainty. Design

guidelines for shoreline forest disturbance will be developed through quantification of forest disturbance in managed and natural shoreline forests. Regional variation in aquatic ecosystem response to shoreline forestry will be tested through operational trials, coupled with appropriate quantitative monitoring techniques and indicators. We will address two aspects of this issue in representative ecozones of northern Ontario, nested within a larger multi-sector adaptive management program: forest disturbance rates on natural versus managed shorelines; and forest succession and composition on natural versus managed shorelines. The products of this research will include regionally specific landscape disturbance standards for riparian forest management in Ontario, and "mini-catchment" and slope-based models of the risk of aquatic sedimentation and shoreline habitat damage during shoreline forestry operations in a range of site types. Significant economic implications are likely as well. Knowledge gained from this research will facilitate integration of Ontario's present suite of management guidelines for riparian forests. This is a key step towards development of science-based, landscape-scale disturbance criteria for managed areas of the boreal forest.

WHERE IS THE RESEARCH BEING DONE?
Ontario

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Azim Mallik

Researchers
Craig Allan, *Robert Mackereth*, *James McLaughlin*, *David Morris*, *Robert Rempel*, *Robert Steedman*

195. Colonization Of Fire- And Harvest-Disturbed Habitats By Arthropods.

Project spencejcolo7

Start Date: April 1, 2001

WHAT RESEARCH IS BEING DONE?

Our project will study movement of several arthropod groups in and out of forested residuals at several scales, using the template available at the EMEND (Ecological Management Emulating Natural Disturbance) site 100 km NW of Peace River, Alberta. This will facilitate process-based predictions of how various landscape patterns affect components of biodiversity critical to forest ecosystem processes. We will focus on how saproxylic beetles (those living in dead wood) respond to the range of modern forest harvesting practices delivered at EMEND in comparison with their responses prescribed fires delivered as part of the experiment. We will examine how spatial arrangement of harvest treatments may affect litter-dwelling beetles and spiders though possible preferential movement of arthropods between harvest blocks that differ in quality. We will measure rates of arthropod immigration and emigration associated with two sizes of forest retention areas left as part of the cutting design in all EMEND compartments. Furthermore, we will ascertain whether absolute densities of species have declined in residual patches since harvest in 1998-99 and relate the answer to what we learn about the balance of movement. These studies will help identify elements of biodiversity that could be at risk in landscapes harvested without attention to spatial issues such as topography and landscape configuration, and more importantly, help design configurations that will conserve biodiversity and associated forest ecosystem function. The work will define sensitive representatives of several functional groups that are suitable for monitoring, and is a first step required in "scaling up" stand-level understanding of ecological processes to landscape-level predictions. Under the "coarse-filter" approach (i.e., managing biodiversity mainly by habitat management) being pursued by Canadian

Forest Products Ltd. and Daishowa-Marubeni International Ltd., development of this ability is critical for t

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
John Spence

Researchers
David Langor, W. Volney

194. Comparing Stand Origin Ages With Forest Inventory Ages On A Boreal Mixedwood Landscape.

Project marshallpcomp7

Start Date: April 1, 2001

WHAT RESEARCH IS BEING DONE?

The study of natural disturbance patterns is becoming increasingly common under the auspices of managing for biological values. This strategy should be particularly effective in the boreal forest where fire regimes are thought to be straightforward, and easy to translate into guidelines. Unfortunately, the most common age data available on boreal landscapes to conduct such analyses are from forest inventories, which we know to be inaccurate. We will build and compare a much more accurate "stand-origin" map with the age map from new inventory data for a 30,000 ha area in northwest Saskatchewan. The objective of this study is to determine the exact nature and degree of any spatial inaccuracies and biases associated with inventory age data, towards identifying the most reasonable and efficient solution for those who would like to pursue more detailed fire history or natural range of variation (NRV) studies. Inventory age data may in fact be a subset of the stand-origin ages. In other words, the boundaries between different age-classes in the inventory are accurate, but within same-aged polygons there exist more precise, subtle age data that the inventory did not identify. If so, this would mean the inventory age data is still valuable on some level, and easy to correct through higher-intensity age sampling. A second possibility is that the age polygon boundaries are accurate, but the ages are not. This situation is a bit more complicated, and any "fix" would have to look for consistent biases in the inventory to help correlate stand characteristics with an age adjustment. A third possibility is that the inventory ages and boundaries have no relationship to the stand-origin ages. This is a worst-case scenario in that it would indicate that inventory-based ages and polygons are of little use in assessing disturbance rates and patterns and that no firm basis for age adjustment exists. Given the growing importance of natural pattern knowledge, it is necessary to understa

WHERE IS THE RESEARCH BEING DONE?
Saskatchewan

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Peter Marshall

Researchers
David Andison, Valerie LeMay

193. Effect Of Frequency Of Disturbances (Fire And Flood) On Age Distributions Of Riparian Forests.

Project johnsoneeffe7

Start Date: April 1, 2001

WHAT RESEARCH IS BEING DONE?

Human pressures such as logging have greatly increased on riparian zones. In addition, management regulations that describe the size of buffer strips that should be left around rivers are often arbitrary, or at least not based on ecological principles. More importantly, disturbances are currently ignored in the management practices of riparian zones, whereas they are an integral part of upland management practices. The objective of this study is to determine how the age distributions of riparian tree species are caused by physical processes related to floods and fires. The study will be conducted along a drainage basin of the Montane-boreal forest. Twenty-five sites will be chosen to represent first, second, third, and fourth order streams. At each site, age distributions of each tree species will be constructed. Next, areas subject to flooding due to discharges of different magnitudes will be calculated. Finally the fire frequency of the riparian forest will be calculated. This study will, for the first time, obtain a disturbance frequency for the riparian zone that is comparable to those available for upland systems. These results will help foresters decide which disturbance they should mimic through their management practices of riparian forests.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Ed Johnson

Researchers

192. Factors Which Influence Methyl Mercury (MeHg) Concentrations In Boreal Shield Ecosystems.

Project leandfact7

Start Date: April 1, 2001

WHAT RESEARCH IS BEING DONE?

Since methylmercury (MeHg) is the most highly toxic form of mercury and only MeHg accumulates in the aquatic food chain leading to fish it is vital that sites for MeHg formation are identified and that degradation pathways be known. Our current research activities have shown that MeHg is produced in wetland regions and exported to rivers and lakes associated with dissolved organic carbon (DOC). Here we will examine the influence of logging and fire disturbances on forest ecosystems that could alter MeHg production and persistence. Our focus will be on changes in natural bogs, fens and other wetlands within the control research area. This will include aspects of changes in seasonal hydrology. In this way, samples will be collected and tested for MeHg in the Haute-Mauricie region of Quebec during the field sampling planned over the next three years. In addition, we will visit sites with extreme levels of MeHg in lakes to determine the specific features of the source location so the creation of such sites can be avoided. Specifically, we ask where is the MeHg coming from and what are the critical factors that influence how long it persists? Degradation through exposure to sunlight particularly UVB radiation is one of the principal degradation pathways for MeHg. We will examine if the

increased DOC resulting from logging activities is sufficient to reduce the rates of photodegradation and provide the appropriate variable so that photodegradation of MeHg can be included in overall models for the fate of mercury in forest/lake ecosystems. In addition, as part of our ongoing research, we will examine rates of degradation by bacteria and determine if the activity of these organisms is adversely altered by fire or logging.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
David Lean

Researchers

191. Impacts Of Post-Burn Salvage Logging On Plant Biodiversity And Tree Regeneration Of The Mixedwood Boreal Forest.

Project macdonaldsimpa7

Start Date: April 1, 2001

WHAT RESEARCH IS BEING DONE?

Within the past decade, salvage logging has become a common post-fire activity in the boreal forest. The removal of fire-damaged trees has important implications for subsequent regeneration, successional dynamics and ecological function of these forests. Salvage logging likely significantly alters the microclimate of the regeneration niche, affects the type and availability of regeneration microsites, and potentially alters seed availability. These will affect post-disturbance regeneration, in turn influencing subsequent successional development and understory biodiversity. In addition, the biomass removed during salvage logging may represent a significant loss of carbon and nutrients, affecting long-term nutrient dynamics of the sites. The effects of this additive disturbance to fire are still largely unknown. This study will examine the effect of coarse woody material removal (salvage logging) in burns on regeneration of the dominant tree species, understory plant biodiversity and community composition, and successional development in the western boreal mixedwood forest. We will determine the roles of changes in above-ground (microclimate, microsite availability) vs. below-ground (soil temperature, moisture, carbon and nutrients) effects in this process. Key questions that will be answered include: 1) Does salvage logging significantly alter tree regeneration and subsequent stand dynamics? 2) Does salvage logging significantly alter understory plant biodiversity over time, and thus might extensive salvage logging place early post-burn plant species and communities "at risk"? 3) How might we alter the practice of salvage logging to minimize these impacts? The data produced by this study will be incorporated into stand- and landscape-level models of boreal forest regeneration and succession and provide information relevant to modelling of socio-economic trade-offs under the TRIAD paradigm.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
S. Ellen Macdonald

Researchers

190. Implementation Of Stand- And Landscape-Level Models Of Forest Regeneration And Stand Dynamics To Investigate Various Management Scenarios Of SFM In Northern BC, Northern Alberta And The Clay Belt Region Of Central Canada.

Project messiercimpl7

Start Date: April 1, 2001

WHAT RESEARCH IS BEING DONE?

Foresters and ecologists have many questions regarding stand and landscape conditions in future boreal mixed-wood landscapes given the variety of silvicultural approaches that are applied or considered. There is, therefore, a need for various types of simulation models to predict future forest conditions at different scales. This integrated research project has four objectives: 1. To complete the calibration of SORTIE/boreal (stand-level model) and SELES/boreal (landscape-level model) for the Abitibi area and run these two models alone and together to address various theoretical and practical questions regarding stand and landscape forest dynamics; 2. To test our models in "real" case scenarios in 3 different areas of the boreal forest (northern BC, northern Alberta and the mixed-wood and black spruce forests of the Claybelt zone); 3. To undertake focused field studies to gather some key missing data and processes for the calibration of our models; and 4. To modify the SORTIE model to have a more flexible architecture so that it can be used and easily modified, including the addition of new submodels, for various regions of the boreal forest.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Christian Messier

Researchers
K. David Coates, *Marie-Josée Fortin*, *David Greene*, *Daniel Kneeshaw*, *S. Ellen Macdonald*

189. Integrated Assessment Of Intensive Forest Management Under The TRIAD Approach To Land Use Design.

Project hauerginte7

Start Date: April 1, 2001

WHAT RESEARCH IS BEING DONE?

This project seeks to provide a landscape level economic assessment of TRIAD approaches to land use zoning and design. The objectives of the project are to analyze the impact of potential TRIAD approaches on economic timber supply, non-timber benefits (in particular wildlife habitat), non-timber human users of the forest, and to provide an economic assessment of intensive forest management under TRIAD approaches. The basic idea of the TRIAD approach is to divide the landscape into three broad land use zones: biodiversity and wildlife habitat reserves which exclude timber harvesting, intensive timber management areas, and extensive management areas which are managed for multiple uses. However, the basic purpose of the TRIAD - to increase non-timber benefits while maintaining timber benefits - may not be feasible in many cases and may not be economically justifiable. Hence, before such strategies are applied on a large scale, it is important to understand the economic implications of such strategies. We will address the following questions about the impacts of TRIAD: 1. To what extent can intensive

timber management compensate for land held in reserves, and is the increased investment in silviculture economically justified? 2. Where should intensive management, reserves and extensive management zones be located and how large should they be? 3. Are additional non-timber benefits generated by increasing forest reserves large enough to exceed losses of non-timber benefits on lands allocated to intensive management? 4. What effects do changes in the pattern of forest access created by TRIAD have on non-timber users of the forest landscape? We will begin answering these questions using a landscape level model called Dualplan, which is ideally suited for economic analysis of forest landscape design.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Grant Hauer

Researchers
Glen Armstrong, Peter Boxall, Martin Luckert

188. Integration Of Public Participation And Bio-Physical And Socio-Economic Modelling For Sustainable Forest Management.

Project kneeshawdinte7

Start Date: April 1, 2001

WHAT RESEARCH IS BEING DONE?

The objectives of this project are: 1) To develop a framework for adaptive ecosystem management guided by public participation (including the evaluation and development of C&I by community, First Nations, researchers, and Industry stakeholders); 2) To initiate and study a process of social learning and public participation for responsible decision-making in a test region in central Quebec; 3) To integrate previously developed biophysical indicators (biodiversity, water quality, soils, and productivity) with social and economic indicators in a spatially explicit landscape level model (SELES/Mauricie) to facilitate the process of integrated resource management decision-making by allowing an examination of trade-offs; 4) To investigate the synergic impacts of natural disturbances, forest structure and succession, and management interventions on the forest landscape; and 5) To permit an evaluation by the focus group of the cumulative effects of management interventions (according to the various scenarios) across spatial and temporal scales, while taking into consideration regional socio-economic and biophysical dynamics and sources of uncertainty (wildfire and regeneration of stands) for the purposes of strategic planning. To meet our objectives, the key questions we will address are: 1. What conditions and characteristics of participants favour social learning that leads to SFM? 2. What procedures facilitate decision-making for SFM given complex data and multiple scales of perception? 3. Can a TRIAD approach more efficiently allocate forest resources in order to maintain biodiversity, water quality, soil fertility, forest productivity, as well as social and economic values than other proposed scenarios and if so, to what degree? 4. Are current resource commitments (AAC) likely to be sustainable given uncertainties? 5. What are the impacts of current and proposed practices on biodiversity, water quality, soil fertility, and forest productivity, and how important are these.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Daniel Kneeshaw

Researchers
Luc Bouthillier, *Pierre Drapeau*, *Andrew Fall*, *Marie-Josée Fortin*, *Alain Leduc*, *Christian Messier*

187. Measuring And Modelling Wetland Disturbances In Western Boreal Mixedwood Ecosystems.

Project footeameas7

Start Date: April 1, 2001

WHAT RESEARCH IS BEING DONE?

Riparian zones are both important contributors to biodiversity and problematic areas of potential timber loss in a commercial forest landscape. Damming effects from beavers and from improperly drained road crossings cause thousands of small flooded regions throughout western Canada. In this study we will investigate these impoundments from beavers and human activities on small streams in commercial forests of central Alberta at three scales; local (detailed, site-based measurements over 60 sites), regional (GIS development on approximately 300 wetlands over 3 townships, subsumes local scales) and regional (simulation modelling over 500,000 ha, subsumes regional and local scales). To develop predictions for future scenarios we will use a spatially explicit model (FEENIX) to derive projections of wetted area, timber losses, wetland species populations, and habitat components altered over a 200-year planning horizon. The model will be parameterized from the empirical field studies in this project and will allow simulations of forest and wetland responses to various inputs of road development, beaver control, and amounts of streamside timber left in buffer strips. The specific questions we will address are: 1. What effects does stream damming (beaver dams and road crossings) have on physical water surface area, riparian shoreline lengths, timber flooding, and wildlife habitat availability on streams in the central Alberta mixedwoods? 2. How much forested area is taken out of production by (a) beaver dams and harvesting; (b) upstream flooding from road crossings? What are the production losses incurred from these activities? 3. What are the regional (500,000 ha scale) effects of various levels of road crossings and beaver dams over the next 200 years as predicted by simulation models that expand our empirical field studies? 4. Do riparian buffer strips affect habitat suitability for beavers, availability or species-mix of merchantable timber, or habitat quality fo

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
August Lee Foote

Researchers
Steve Cumming

186. Modelling The Spatial Dynamics Of White Spruce And Aspen In The Boreal Mixedwood.

Project greenedmode7

Start Date: April 1, 2001

WHAT RESEARCH IS BEING DONE?

The factors controlling the distribution of white spruce in the western boreal are not well understood. For example, even the mechanisms by which mixed stands develop are controversial. Some studies indicate that most white spruce establishes within a year or two after a fire kills the existing canopy and exposes mineral soil on which spruce seeds can establish and grow. However, other studies suggest that "delayed recruitment" of white spruce into mature and old aspen stands (e.g., on decayed downed logs) does occur, and may be important in maintaining the species on the landscape. The relative importance of these two processes is unknown, as is the average time required for white spruce to dominate the canopy. It is therefore not possible to compare current silvicultural practices, and their "mixedwood management" alternatives relative to the natural dynamics of white spruce in mixedwood stands. The first objective of this study is to encapsulate presently available knowledge, and results of ongoing research on white spruce, into an existing spatial dynamic (landscape) model of the mixedwood region. We will then evaluate alternate hypotheses regarding the importance of the two recruitment mechanisms, to determine if either is consistent with the known patterns of present and historical abundance of white spruce. The second objective is to develop models of the more important silviculture systems in use or being studied, and to evaluate their consequences on the landscape over meaningful time, relative to natural processes. The third objective is to improve the physical and biological realism of the underlying models, by refining the models of potential recruitment in post-fire stands, incorporating the influence of large canopy spruce trees within aspen stands, and accounting for some of the effects of climatic and site variability within the region.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
David Greene

Researchers
S. Ellen Macdonald

185. Natural Variation In Nutrients, Methyl Mercury And Waterfowl In Western Boreal Wetland Ponds: Implications For Forest Harvesting.

Project bayleysnatu7

Start Date: April 1, 2001

WHAT RESEARCH IS BEING DONE?

Wetlands make up a large area in the western boreal forest (WBF) and little is known about the impact of forest harvesting on them. Forest industries leave buffer zones around wetlands to ensure that runoff from harvested uplands does not adversely affect wetland complexes and the water quality of downstream lakes and rivers. However, it is difficult to predict the effects of changes in runoff since there are so many types of wetlands and such a wide natural variation in water quality, vegetation and wetland communities across the boreal plain. This project will investigate the natural variation in water quality (including nutrients, methylmercury (MeHg) and dissolved organic carbon (DOC)), vegetation and water birds in wetland ponds across a range of wetland types (bogs, fens, marshes and swamps) in the Weyerhaeuser forest management agreement areas (FMA) in Alberta and Saskatchewan. Specifically we will: 1) Characterize the relationships between wetland type and nutrients, vegetation, and zooplankton; 2) Relate wetland characteristics to MeHg production; 3) Correlate wetland type with water bird numbers and

distribution; 4) Assess the potential susceptibility of the various wetland types to additions of nitrogen, phosphorus and Hg from logging; and 5) Develop indicators, and statistical models to determine potential susceptibility of wetlands to logging. From this research we will develop management guidelines or protocols to assist industry to plan buffers for wetland protection. This project will extend our understanding of the natural variation in wetlands to other regions of the WBF and assess the potential susceptibility of the various wetland types to additions of nitrogen, phosphorus and mercury. It will establish whether there is a gradient of nutrients across the WBF and assess the relative importance of biotic controls of water quality in shallow wetland pools. It will extend our Alberta lake survey of MeHg to boreal wetlands. It will provide necessa

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Suzanne Bayley

Researchers
August Lee Foote, *Vincent St. Louis*

184. Public Involvement In Forest Management And Land Use Planning On Manitoba's East Side.

Project sinclairapubl7

Start Date: April 1, 2001

WHAT RESEARCH IS BEING DONE?

The dual movements from consultation to participation and from sustainable forest management (SFM) for a forest license to wide area land use planning provide the context for our research. The purpose of this research is to understand the actual and potential reciprocal contributions of public involvement in planning to learning, and of learning to successful planning as measured by the ideals of sustainability. A key theoretical perspective in this endeavour is that of transformative learning - a theory of how adults learn. Thus we will examine what people learn through consultation and participation in forest management planning initiatives, the role of such learning in ensuring that SFM is a powerful tool for achieving sustainable development, and the relationship between public involvement in SFM planning and land use planning. This study will be guided by the following research questions: 1) What are the criteria for successful public involvement in SFM planning? 2) What are the conditions that favour effective, efficient and fair public involvement? 3) What are some of the representative value orientations amongst individual participants in existing forest planning activities? 4) Does transformative learning take place within existing public involvement frameworks? 5) What are the linkages between individual learning and social learning? 6) How can wide area land use planning complement, utilize and enhance existing forest planning public involvement networks? The research approach will be interactive and adaptive within a case study framework. Manitoba's east side provides the broad geographic context within which the study will take place. Within the broader case study, a comparative case study approach will be used. Criteria will be established for selecting, from the long list of forest management public involvement activities on the east side, several cases for comparative case study consideration.

WHERE IS THE RESEARCH BEING DONE?
Manitoba

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
A. John Sinclair

Researchers
Peter Miller

183. Public Involvement On A Crown License In Newfoundland: Corporate And Government Efforts To Integrate Social Values Into Ecosystem Management.

Project beckleytpubl7

Start Date: April 1, 2001

WHAT RESEARCH IS BEING DONE?

This research will entail a case study of public involvement by Abitibi-Consolidated Inc. on its Crown license in Newfoundland (the Grand Falls mill). As well, the case study will review provincial public involvement efforts in the same region. The review of public involvement will cover the following elements: 1) Provincial requirements (minimum standards) for annual operating plans and long-term management plans; 2) Corporate practice (degree to which minimum standards are exceeded) for annual operating plans and long-term management plans; 3) A review of specific methods and tools for involving stakeholders in planning and monitoring of forest management activities; and 4) An evaluation, from various stakeholder perspectives, of the effectiveness of the public involvement program. The review will involve face-to-face interviews with a range of participants in the public involvement process, from provincial government representatives, to corporate representatives, to community, environmental, recreational and non-local general public stakeholders. Each will be asked to evaluate how well the existing system accounts for the broad spectrum of stakeholder values that should be incorporated into management. As well, each will be asked to comment on the efficacy of the existing system for dealing with particularly thorny issues. The review will also rely on extensive documentation kept by Abitibi-Consolidated Inc. regarding their record of public consultation. Current practice in public involvement for this area will also be compared with various standards for certification. As well, the evolution of public involvement practice will be reviewed for the past 20 years. The intent of this case study is to determine what works (and according to whom), what might be improved, and ultimately to compare the state of practice in Newfoundland with other jurisdictions across Canada via other projects within the Public Participation research group.

WHERE IS THE RESEARCH BEING DONE?
New Brunswick

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Tom Beckley

Researchers

182. Public Participation And Canada's Model Forests: The Case Of Fundy.

Project duinkerppubl7

Start Date: April 1, 2001

WHAT RESEARCH IS BEING DONE?

Canada's Model Forests (MFs) were established in 1992 as experiments in sustainable forest management (SFM). The aim of the network of MFs is to achieve SFM through partnership. While public participation in SFM decision-making is not an explicit objective of the MFs, nevertheless each one has become a testing ground for means and mechanisms to improve stakeholder cooperation in discovering and implementing strong approaches to SFM. The same kinds of stakeholders are involved in the MFs as are usually involved in public-participation exercises related to forest decision-making. Therefore, one might ask whether the MFs represent some legitimate kind of forum of public participation. A further question then arises for specific governments and industrial license-holders where MFs exist - to what degree do MFs, through their partnership operations and projects, represent public participation as called for under provincial law and various forest certification schemes? This project aims to shed light on this question by examining the case of the Fundy Model Forest (FMF) in southcentral New Brunswick. The main hypothesis to be tested is: the activities and operation of the FMF are sufficient for government and industry to meet their legal and certification-related requirements for public participation related to the MF landbase. The objectives of this project are to: 1. Define in detail the public-participation expectation of and requirement on the main industrial partner in the FMF, as embodied in provincial regulations and forest certification schemes being pursued by the company; 2. Document in detail the partnership structure, operations, activities, and projects of the FMF as these relate to the defined expectation and requirement of public-participation programs for the FMF landbase; 3. Document the opinions of a variety of forest stakeholders in the FMF areas - both MF partners and others - on the question to what degree the FMF fulfills people's expectations reg

WHERE IS THE RESEARCH BEING DONE?
Nova Scotia

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Peter Duinker

Researchers

181. Public Participation In Forest Management Through Local Citizens Committees In Northwestern Ontario.

Project kantspubl7

Start Date: April 1, 2001

WHAT RESEARCH IS BEING DONE?

Public dissatisfaction with past practices has led to demands for increased public participation in forest management in Ontario. In view of these demands, Ontario's Crown Forest Sustainability Act has mandated the establishment of Local Citizens Committees (LCCs) "to advise the Minister on the preparation and implementation of forest management plans". However, preliminary studies suggest that many LCCs may not be able to achieve the main objective of increased public participation in forest management. This research will evaluate the comparative success of LCCs in terms of public participation. The main purpose of this research is to identify the linkage between sub-regional social capital, and the process and the end of process outcomes of LCCs. This project will include: 1) Evaluation and comparison of the processes of LCCs, the end of process (pre-implementation of management plan) outcomes of LCCs, and the components of the social-capital in the areas of respective LCCs; 2) Identification and analysis of the linkages between the processes, the end of process outcomes, and components of social capital in the areas of corresponding LCCs; and 3) The identification of the factors for different

degrees of success of LCCs. The research will be done in northwestern Ontario, and three district-level LCCs who are working presently on forest management plans have been selected in collaboration with officials from the Ontario Ministry of Natural Resources (OMNR). On theoretical aspects, the research will contribute to theory on collaborative decision-making by identifying the links between the components and dimensions of social capital and community-based collaborative process and the end of process outcomes. On applied aspects, it will be useful to the OMNR to improve the working of LCCs.

WHERE IS THE RESEARCH BEING DONE?
Ontario

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Shashi Kant

Researchers
David Balsillie

180. Quantifying The Impacts Of Managed Disturbance Regimes On Carbon Stocks And Fluxes In Eastern Boreal Forests Of Canada.

Project pengcquan7

Start Date: April 1, 2001

WHAT RESEARCH IS BEING DONE?

Intensive forest management practices may significantly reduce forest site productivity and carbon storage. Under the Kyoto Protocol, Canada has agreed to reduce its greenhouse gas emissions by six percent (6%) from 1990 levels by 2010. Canadian boreal forests are viewed as a potential means of sequestering a mass of C equivalent to some of the emissions. Before an assessment of this potential can be obtained, a scientific understanding is required of the C stocks and flows in existing forests, and of the likely importance of management practices. In this project, we will develop a better understanding of how harvesting will impact the carbon budget of the Lake Abitibi Model Forest in eastern Ontario and its adjacent area in west Qu?bec in order to make informed management decisions for land-use in Canadian boreal forests. Our overall objectives are to assess the likely impacts of management practices on C stocks and fluxes of boreal forest ecosystem in the Lake Abitibi Model Forest and its adjacent region (north of Villebois) in west Qu?bec, and to improve the scientific understanding of long-term (year to decade) impacts of managed disturbance (partial and clear cutting) and natural disturbance (e.g., post-fire succession) on the forest carbon budget. Specifically, two questions will be addressed: 1. How do forest protection, operational harvesting, and silvicultural treatments affect C sequestration in a managed forest landscape? 2. What are the sensitivities of these effects to changes in management intensity (including partial and clear-cutting) and to variation in the natural disturbance cycles?

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Changhui Peng

Researchers
Mike Apps, *Yves Bergeron*, *Pierre Bernier*, *Qinglai Dang*, *David Paré*

179. Soil Microbial Diversity As An Indicator For Forest Management.

Project mohnwsoil7

Start Date: April 1, 2001

WHAT RESEARCH IS BEING DONE?

The long-term objective of this project is to determine whether an index of soil microbial diversity can be a useful part of a broader Index of Boreal Forest Biodiversity. Our short-term objective is to answer the basic questions necessary to determine the feasibility of developing such an index of soil microbial diversity. Another aspect of our work will be development of microbial community analysis methods and comparison of new and existing methods. The main hypothesis to be tested is that boreal soil microbial community structure differs measurably between stands that differ in their degree of human disturbance or their level of ecosystem function. To test this hypothesis, we will intensively study the spatial and temporal heterogeneity of soil communities in two stands differing greatly in their degree of human impact. We will adapt existing molecular methods, and develop new ones, for characterizing the composition of forest soil microbial communities. We will obtain and assay samples from two forest stands over a three-season period. Sampling will permit comparisons over spatial scales ranging from cm to km and over a temporal scale of months. We will compare the similarity of microbial communities within and between stands using cluster analysis. We will also compare richness, evenness and diversity indices within and between stands. Results with the different assay methods will be compared for validation, to determine diversity at different taxonomic levels and to identify the most useful assay(s).

WHERE IS THE RESEARCH BEING DONE?
British Columbia

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
William Mohn

Researchers

178. Spatial Aspects Of Boreal Mixedwood Succession And Stand Dynamics.

Project comeaupspat7

Start Date: April 1, 2001

WHAT RESEARCH IS BEING DONE?

The issue of boreal mixedwood management has risen in prominence over the past decade, with increased use of both aspen and white spruce in the boreal forest. An improved understanding of mixedwood stand dynamics will contribute to the development of management practices that are ecologically as well as economically sound. We will use a quantitative analysis to address several questions: 1. After the initial regeneration phase, do aspen patches expand over time? What is the relationship between this and initial aspen density and spatial pattern? 2. After initial post-disturbance white spruce establishment, do established patches of white spruce increase in size and density over time? Are there subsequent episodes of white spruce recruitment in stands older than 40 years old? What is the relationship between this and initial white spruce densities and spatial patterns? 3. In stands older than 20 years, what initial threshold densities and configurations of aspen preclude subsequent white spruce infill? 4. Do patches of white spruce preclude future aspen regeneration? Under what spatial configurations (aerial extent and density within the patches) would white spruce understory protection result in poor regeneration of aspen

and conversion of a mixedwood stand to a spruce stand? 5. What processes control growth of white spruce into an aspen canopy, with respect to spruce-aspen spatial relationships (i.e., do spatial factors such as whipping act to keep spruce in the understory)? The answers to these questions will provide guidance as to the best spatial arrangements and spatial mix to maximize productivity at the stand level, and provide alternatives and or modifications to current silviculture and stand tending concepts used in tree spacing and patch retention. This research will also tie into and provide data for validation and further development of spatial stand- and landscape-level models such as TASS, SORTIE, and FEENIX.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Phil Comeau

Researchers
S. Ellen Macdonald

177. Spatial Configuration Of Forest Remnants That Maintain Biodiversity In Highly Managed Forest Landscapes: A Multiscale Approach.

Project drapeaupspat7

Start Date: April 1, 2001

WHAT RESEARCH IS BEING DONE?

In the boreal forest, the shift from natural to anthropogenic fragmentation has raised concerns about the maintenance of biodiversity in forest management areas (FMA). New silvicultural approaches based on natural disturbance dynamics have recently been developed and are being tested in the eastern boreal forest. These approaches use size distribution in natural disturbances, and shape and proportion of remnant forests inside disturbed landscapes as a reference for the spatial design of harvesting. This approach does not, however, integrate organism's functional responses to fragmentation. Our research, combined with data already collected, will assist in determining spatial configurations of harvesting that will minimize the impact of fragmentation on biodiversity. We will develop parameters for the size, shape and spatial distribution of remnant forests in cutting units from results of fragmentation effects on birds and epiphytic lichens. Edge influence on forest structure, vascular plants, and non-vascular plants of remnant forests will also be assessed. Our specific objectives are: 1. To predict the response of biodiversity indicators (vascular plants, non-vascular plants and songbirds) to the spatial pattern of remnant forests for different levels of fragmentation, with emphasis on highly fragmented managed landscapes; and 2. To develop management guidelines for the spatial configuration of remnant forests that are functionally meaningful from an organism's perspective at multiple spatial scales (from local to regional scales). Through knowledge of the relative importance of regional habitat loss, patch size, isolation and edge influence, our research will identify the thresholds and patterns of fragmentation in boreal landscapes that are critical for the maintenance of biodiversity. This will improve forestry practices, particularly in the planning of remnant forests in cutting units at the operational level of decision in forest management.

WHERE IS THE RESEARCH BEING DONE?
Quebec

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Pierre Drapeau

Researchers
Yves Bergeron, *Louis Imbeau*, *Alain Leduc*

176. Stand- And Landscape-Scale Drivers Of White Spruce Regeneration In The Boreal Mixedwood.

Project macdonaldsstan7

Start Date: April 1, 2001

WHAT RESEARCH IS BEING DONE?

The western boreal mixedwood forest can be described as a shifting mosaic, where communities are constantly responding to successional pathways initiated by varying frequency and intensity of disturbance, primarily fire. Our previous research has shown that micro-site level environmental conditions and seed availability in the immediate post-fire period are critical for establishment of white spruce on mixedwood sites and that recruitment of white spruce onto mixedwood sites is poor to nil between 4 and 30 years post-disturbance. As such, the co-occurrence of mast seed years and fires appears to be critical for the maintenance of white spruce in the boreal mixedwood. This project will address a few of the final questions regarding dynamics of white spruce during the early stages of mixedwood stand development and go on to explore landscape-level factors contributing to persistence of white spruce in the boreal mixedwood. Our specific objectives are to: 1. Examine factors influencing the growth of early- and later-recruiting white spruce, and the effect of herbivory on their survival and movement into the canopy; 2. Quantify the effects of canopy composition on growth and survival of young understory white spruce; 3. Examine the impact of pre-burn stand composition on probability of burning, and on creation of microsites suitable for recruitment of white spruce; 4. Examine the relationship of site factors to stand composition and the interaction with probability of burning; and 5. Quantify the role of veteran white spruce trees on persistence of white spruce in the boreal mixedwood.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
S. Ellen Macdonald

Researchers
Mark Dale, *David Greene*

175. Sustainable Resource Stewardship: A Plan Of Action For The Central Yukon.

Project hickeycsust7

Start Date: April 1, 2001

WHAT RESEARCH IS BEING DONE?

The traditionally used territories of the four First Nations of the Central Yukon are located in a contiguous area and are linked by way of the Yukon River System. The Central Yukon First Nations (CYFN) of Nacho Nyak Cum, Little Salmon Carmacks, Selkirk, and Tr'ondek Hwech'in

have identified and are implementing an overall strategy for the conservation and stewardship of their traditionally used territories. In the development and implementation of this strategy it is recognized that the forest component requires the: 1. Determination of the existing level of forest use specific to each of the four central Yukon communities; and 2. Development of a consultation framework towards attaining an informed and equitable role for CYFNs in forest management. The CYFNs have entered into a range of partnerships involving private institutions, government agencies and Canadian and US universities to support this strategy. This research project works towards formalizing a partnership between the CYFNs and the SFM Network, and the development of a detailed research program. This research initiative will contribute to the sustainability of forest resources in the central Yukon and the communities who continue to depend upon the availability of those resources, and will promote the goals and objectives of the SFMN and its partners.

WHERE IS THE RESEARCH BEING DONE?
Yukon

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Cliff Hickey

Researchers
David Natcher

174. The Economics Of Intensive Forest Management.

Project vertinskyithee7

Start Date: April 1, 2001

WHAT RESEARCH IS BEING DONE?

Forest companies and the Government of Canada are examining intensive forest management as a means to maintain or improve forest product flows while accommodating demands for alternative uses of forests. The overall objective of this research is to develop a methodology for comprehensive economic analysis of intensive forest management and apply it to provide guidelines for corporate and public decision-making. The research will consist of two interrelated activities: 1. The development of a methodology for assessing forest level management strategies in general and options for intensive silviculture in particular; and 2. The application of the methodology to case studies involving different regulatory regimes and biogeoclimatic types. The economic assessment of silvicultural strategies will be completed from both a firm (private) and a social (public) perspective taking into account various costs and benefits associated with the forest, including non-market benefits. The analysis of the gap between optimal prescriptions derived from private versus public perspectives will provide indications of institutional adjustments necessary to close the gap (i.e., changes in policies, regulations and economic instruments used).

WHERE IS THE RESEARCH BEING DONE?
British Columbia

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Ilan Vertinsky

Researchers
David Balsillie, Karel Klinka

173. The Effect Of Harvesting Practices And Buffer Strip Width In Boreal Riparian Forests On Water Quality And Ecological Integrity Of The Nearshore Zone Of Lakes.

Project sibleypthee7

Start Date: April 1, 2001

WHAT RESEARCH IS BEING DONE?

The significance of aquatic-terrestrial interfaces (ecotones) has long been recognized in terms of maintaining ecological integrity in aquatic systems, but few detailed studies have been conducted in lakes, particularly those in the boreal forest region of northern Ontario. We suspect that interactions occurring at the aquatic-terrestrial interface in boreal lakes are pivotal for many aquatic near-shore processes and communities, but the nature of these interactions, and their relative sensitivity to disturbance in adjacent riparian forests, are poorly understood. This project asks how disturbance regime and/or buffer width in riparian forests affects the structural and functional integrity of nearshore areas and the energetic and biotic linkages that exist between the nearshore zone and adjacent riparian areas. Our three principal objectives are: 1. Assess changes in energy flux through the aquatic-terrestrial ecotone by measuring major annual nutrient, organic matter, and hydrological inputs to the near-shore zone of boreal lakes in relation to varying intensities of forest harvesting and riparian buffer width; 2. Assess and monitor the relationship between terrestrial inputs and the structural integrity (e.g., community composition, biomass) of nearshore aquatic communities; and 3. Assess and monitor the relationship between terrestrial inputs and the functional integrity (partitioning, processing, and allocation of energy inputs) of nearshore aquatic communities. This research is specifically directed toward improving our understanding of the relationships between natural and anthropogenic disturbance within riparian forests, and of the importance of buffer strips, and ecological and biogeochemical responses of nearshore aquatic communities. Information derived from this research will be used to develop practical models to facilitate improved predictions of the consequences of forest harvesting practices, and buffer strip width, on the ecological integrity of

WHERE IS THE RESEARCH BEING DONE?
Ontario

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Paul Sibley

Researchers
James Buttle, *Andrew Gordon*, *Narinder Kaushik*

172. The Impacts Of The International Regime On Sustainable Forest Management In Canada: Evaluation And Policy And Strategy Recommendations.

Project vertinskyithei7

Start Date: April 1, 2001

WHAT RESEARCH IS BEING DONE?

Despite the increasing influence of the "international regime" on the management and the economic and environmental outputs of Canadian forests, there has been no systematic

comprehensive analysis of the various institutions and the relationships between them. Our research group will analyze several key elements of the international regime that may affect sustainable forest management in Canada and examine the interaction between them. In the first phase of the research, (1) "hard law" trade-related agreements including WTO, NAFTA (and its subsidiary agreements) and present and potential agreements on softwood lumber exports to the U.S., (2) major "hard law" environmental agreements including the Kyoto Protocol, and (3) the Montreal process and the FSC ("soft law" processes), will be examined. The incentives and restrictions that each agreement, process or institution is creating in general will be assessed. Our group will examine these incentives and restrictions in the context of alterative means of implementation, including the most current Canadian plans in the context of alternative provincial policies. We will also examine the degree to which the incentives created by each institution are consistent with those created by others. To assess direct economic and environmental consequences, several (5-7) corporate case studies will be used. For each case study, the research will model corporate responses to the incentives created, and their economic consequences, and use expert judgment to assess the impacts of these responses on the environment.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Ilan Vertinsky

Researchers
David Balsillie

171. The Role Of Natural Resources In Community Sustainability.

Project hickeycther7

Start Date: April 1, 2001

WHAT RESEARCH IS BEING DONE?

This project will analyze the relationship between forest management and community stability by determining how features of the biophysical landscape are mediated culturally and institutionalized into the social structure of First Nation communities. We will undertake an analysis that specifies the need for land and resources among the LRR/TC First Nation communities (John D'or, Garden River, Fox Lake, Tall Cree North, and Tall Cree South). We will then estimate the amount of land-based resources required to sustain current and future levels of use, especially given that this use will be affected by agricultural and industrial expansion. In addition, this research will articulate the fundamental importance of subsistence resources in maintaining the cultural continuity of community members who are engaged in subsistence pursuits. Specifically, this research will: 1. Document the frequency and quantity of country foods and land-based resources (i.e., fuelwood, berries) used by community members over a one-year period; 2. Document and map the seasonal patterns and range of community harvesters; 3. Determine the amount of time community members devote to harvesting activities (harvesting effort - success rate); 4. Estimate costs and expenditures of taking part in harvesting activities; 5. Identify the social relations of harvesting, production, distribution and consumption of harvested resources; and 6. Identify barriers that may limit individual involvement in harvesting activities (i.e., time, cost, knowledge, competition). Concurrently, we shall undertake an assessment of the land-based resource needs of the community. Thus we shall identify both harvesting and barriers to harvesting within the LRR/TC First Nation communities. Our research will provide the First Nations with a better view of needed future research to respond to

industrial forest management objectives and to support Aboriginal and treaty rights.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Cliff Hickey

Researchers
David Natcher

170. Understanding Boreal Forest Age And The Quantification Of Remaining Forest Structures Inside Of Fire Boundaries.

Project sanchez-azofeifagunde7

Start Date: April 1, 2001

WHAT RESEARCH IS BEING DONE?

Previous research has identified the need to develop better techniques for the identification, using new remote sensing techniques and satellite platforms (e.g., IKONOS and ASTER), of coniferous and deciduous forest stands as a function of age. There is also a need to bring the imprint of fires in the landscape scale up to a new level of understanding - necessary for determining the extent of live vegetation residuals inside of burned areas. The objectives of this project are: 1. To study and develop remote sensing based techniques that will allow us to more accurately estimate forest age in boreal ecosystems using new satellite sensors, improving our capacity to predict the impact that industrialization has on bird biodiversity within the boreal forest; and 2. To develop remote sensing based techniques, using new remote sensing platforms, that can be used to estimate the extent and status of residual live vegetation inside of large forest fires so that a) a better link between biodiversity monitoring systems and forest fires can be identified and b) more accurate estimates of the impacts of large forest fire areas on Annual Allowable Cuts (AAC) can be developed, using state-of-the-art remote sensing knowledge.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Gerardo-Arturo Sanchez-Azofeifa

Researchers
Stan Boutin, *Susan Hannon*, *Benoit Rivard*

169. The Potential Of Short Rotation Forestry On Marginal Farmland In BC And Alberta To Provide A Feedstock For Energy Generation And To Reduce Greenhouse Gas Emissions.

Project saddlerjthep6

Start Date: January 1, 2001

WHAT RESEARCH IS BEING DONE?

The forest industry is Canada's leading manufacturing sector and the largest industrial energy

consumer. As recognised in the Kyoto Protocol, forests act as both sources and sinks of carbon; therefore, forestry activities, i.e., deforestation, afforestation and reforestation, can have significant impacts on the way greenhouse gas (GHG) reductions are calculated. Wood presents an attractive option for generating energy for the industrial and transportation sectors as it replaces the inherently carbon-intensive fossil fuels and also promotes forestry and biomass production. One viable option for production of wood within the boreal region of Northern BC and Alberta is to establish short-rotation forest plantations on marginal farmlands. These plantations will increase the terrestrial carbon stock, provide an alternative source of income for the landowners, and may have additional environmental benefits such as improving biodiversity and preventing soil erosion. Such plantations increase the terrestrial carbon sink by sequestering atmospheric carbon in the form of wood biomass both above and below ground. Currently, there are a number of technologies available that can utilise the wood generated from such plantations to produce "renewable energy". A major criterion for selecting a wood-to-energy technology for Canada should be its potential in reducing GHG emissions. The objectives of this project are: 1. To assess the potential of short rotation forest plantations on marginal farmlands for production of wood as a feedstock for energy production; and 2. To assess the potential of ethanol and wood-derived electricity produced from the short rotation forest plantations for reducing greenhouse gas emissions as compared to gasoline and other fossil fuels.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
John Saddler

Researchers
Alireza Esteghlalian

168. BORNET: An International Network To Evaluate Boreal Forest Habitat Loss.

Project innesjborn6

Start Date: October 16, 2000

WHAT RESEARCH IS BEING DONE?

Foresters and public agencies worldwide increasingly are interested in new management styles that include both retention of significant volumes of timber in harvested areas and large unharvested forest reserves in forest landscapes. We will be addressing the following three questions: 1. How much forest must be fully protected in forest reserves? 2. How much timber do we need to leave in the matrix surrounding forest reserves, and how is it best distributed? 3. How can management effectively restore/re-create important features that are required to maintain biodiversity? Under BORNET, we will conduct an international synthesis of available information that can answer these questions or identify crucial gaps in understanding that require specific, targeted research. Specifically we will: 1) Partition the boreal forest into strata characterized by similar disturbance regimes and ecological processes; 2) Define gradients of historical use of forests by humans; 3) Compare and evaluate the biodiversity consequences of current management across this gradient; and 4) Develop biodiversity criteria for defining tolerable loss of boreal habitat for groups and types of species especially sensitive to habitat loss and that can serve as indicators. In the longer term, we also seek to foster an international focus for these aspects of boreal forest management. Finally, results of this work will be communicated to stakeholders and end users both nationally and internationally.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
John Innes

Researchers
Per Angelstam, *Yuri Baranchikov*, *Pierre Drapeau*, *Andrei Gromtsev*, *Bill Mattson*, *Jari Niemela*, *John Spence*, *W. Volney*

167. WARP II Data Base For Modeling Water Quality And Watershed Disturbance On The Boreal Plain.

Project prepasewarp6

Start Date: September 1, 2000

WHAT RESEARCH IS BEING DONE?

This project is a large-scale field based program focusing on collecting information about water quality and quantity in the boreal mixed-wood and similar forests. This study will provide a quantitative assessment of the effects of intense watershed disturbance on nutrient transport to streams. The objectives of this project are to: 1) Collect water quality, flow and physical channel properties for our study streams; and 2) Characterize essential soil and vegetation characteristics of the watersheds associated with our study streams. The Virginia and Swan Hills area is an ideal location to initiate the study, combining good baseline data from the 1980s, with a large recent (1998) forest fire and the opportunity to evaluate various approaches to harvesting on relatively undisturbed watersheds. We will use leading edge stream sampling and data storing techniques. Our key hypotheses are: 1. Phosphorus export to streams following hot ground fires will increase, but not differ from those associated with comparable intensities of winter logging, because soil disturbance is minimal in both cases; 2. Nitrogen export to streams will not differ between burned, logged or reference systems; 3. Impact of watershed disturbance will depend most on relative size of the watershed, not buffer strips; and 4. Soil compaction, infiltration rates and hydrophobiscity indices, which have a strong influence on nutrient export from terrestrial into aquatic systems, will not differ significantly between burned, logged or reference systems.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Ellie Prepas

Researchers
David Chanasyk, *Gordon Putz*, *Daniel Smith*

166. Population Ecology Of Marten (Martes Americana) In The Boreal Forests Of Northern Ontario.

Project fryxelljpopu6

Start Date: August 1, 2000

WHAT RESEARCH IS BEING DONE?

Conserving biodiversity is now a key goal of forest management. We view this project as a

significant part of a process to develop a suite of indicators and umbrella species for monitoring and maintaining biodiversity in boreal forests. Understanding the biology of these species is important to ensure that they do in fact indicate sustainable forest use. In Ontario, marten are viewed as old growth forest indicator species, within the context of disturbance emulation, and guidelines for marten habitat restrict forest management. However, despite 50 years of intensive timber harvesting, there has been no proven decline in marten harvest. Recent anecdotal and scientific evidence suggests that marten may use younger forests than was suspected. Therefore, their value as an old forests indicator species is questioned. This study will be conducted on two large forest areas, in northeastern and northwestern Ontario. Within each area, two forest landscapes will be identified, one older and unmanaged, and one younger and harvested over the past 50 years. Within each landscape, untrapped commercial traplines would act as controls on mortality. We will acquire a better understanding of the ecological factors and mechanisms that drive marten populations, i.e., the relationship between marten and their prey, habitat suitability, fitness, and social behaviour. We will develop improved forest management models. This is the first stage of a study that will assess marten as an umbrella species to enable monitoring of sustainable forest use. Our objectives are: 1. To determine the value of marten as indicator species of boreal old-growth forests; 2. To understand marten (Martes americana) population dynamics and habitat requirements in logged vs. uncut forest landscapes; 3. To identify habitat characteristics critical to marten sustainability; 4. To assess the validity and make improvements to marten habitat management guidelines; 5. To assess the capability of marten to act as

WHERE IS THE RESEARCH BEING DONE?
Ontario

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
John Fryxell

Researchers
James Baker, *Don Barnes*, *Thomas Nudds*, *Ian Thompson*

165. Surface Water Response To Disturbance.

Project prepasesurf6

Start Date: August 1, 2000

WHAT RESEARCH IS BEING DONE?

This project is assessing water quality, flow and physical channel properties for study streams in the Headless Valley area of Alberta. Specifically the project will measure and analyze data from recently burned, logged and reference streams. This study will complement a modeling initiative designed to assess the potential impacts of alternative forest management strategies on water quality and quantity. The study will use leading edge stream sampling techniques and advanced technology for the measurement of compounds of concern to human health.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Ellie Prepas

Researchers
David Chanasyk, *David Graham*

164. A Forest Management Planning System Incorporating A Stochastic Model Of Disturbance Regimes: Planning For Timber Production, Wildlife Habitat And Risk Management In A Wildfire-Dominated Ecosystem.

Project armstronggafor6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

Wildfire is one of the most important agents of disturbance in the boreal forest of Canada, in terms of the magnitude of the area disturbed, the effect on wildlife habitat and timber supply, and the amount of money spent on fighting forest fires. Despite its importance, wildfire is poorly accounted for in most of the forest planning systems used by governments and forest products companies in Canada. Wildfire has been a major factor in creating the diversity of habitat that exists in the boreal forest. Post-fire salvage operations are likely to have an influence on the diversity of habitat created by disturbance. There has been considerable discussion about forest management strategies designed to reduce the risk of large forest fires through manipulation of the spatial distribution of vegetation types and age classes. A computer-based modelling system incorporating a model of the disturbance regime operating on a forest management agreement area or similar forest-planning unit will be developed. It will be used to address a number of questions: 1. Given a desired sustained harvest level and a model of the disturbance regime, what is the probability of successfully achieving the desired harvest level in each year of the planning horizon? 2. What are the financial, timber supply and habitat diversity implications of alternative post-fire salvage policies? 3. What are the financial, timber supply, and habitat diversity implications of landscape level manipulations? Are they likely to have any significant effect on the probability of the occurrence of large fire events?

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Glen Armstrong

Researchers
Vic Adamowicz, *Jim Beck*, *Grant Hauer*, *Fiona Schmiegelow*

163. Advanced Oxidation Processes For The Removal Of Toxicity From Pulp Mills Wastewater.

Project smithdadva6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

Many Canadian pulp mills now use activated sludge and aerated lagoons to treat their effluents before they discharge them. If the pulp mill industry is to meet the new and more stringent discharge limits, more sophisticated forms of wastewater treatment will be required. Treatment technologies must degrade those chemicals that are toxic and are difficult to degrade biologically. Advanced oxidation processes (AOPs) employ the very high oxidizing capacity of the hydroxyl radical to degrade organic and inorganic compounds in wastewater. The hydroxyl radical can be generated in water through different combinations: ozone and hydrogen peroxide; ozone and UV radiation; hydrogen peroxide and UV radiation, or ozone at high pH values. Degradation of

chemical compounds by AOPs usually yields environmentally acceptable products that are less toxic and more biodegradable than other treatment processes. In this project, we will: 1) Further our understanding of the chemical oxidation of toxic chemicals related to resin and fatty acids present in pulp mill effluents by AOPs; 2) Determine the effect of advanced oxidation process parameters on the removal of selected toxic chemicals; 3) Use biological toxicity tests to evaluate the removal of toxicity; 4) Establish the degradation kinetics of selected toxic chemicals; and 5) Develop a quantitative AOP model for predicting the removal of selected toxic chemicals from pulp mill wastewater.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Daniel Smith

Researchers

162. Analysis Of Wildlife Harvest Statistics At Multiple Scales To Assess Impacts Of Boreal Forest Management.

Project thompsonianal6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

Current thinking in forest management is that forest practices should emulate natural disturbances as much as possible. In this project, we plan to test two hypotheses that challenge this: 1) Forest management creates patterns of forest structure and composition across temporal and spatial scales that do not differ from those created by natural disturbances; and 2) There are no differences in wildlife populations and communities between managed and naturally disturbed landscapes. Changes in populations and thresholds of changes need to be predicted and tested in several areas of the country, because future biomonitoring of indicators will be a cornerstone of management to maintain biodiversity. In our research, we will: 1. Assess the effects of forest management on wildlife species at multiple scales, compared to effects of natural disturbances; 2. Assess the appropriate scales at which to measure effects of forest management for various wildlife species; and 3. Determine which species might be used to predict effects at various scales. We will use existing Ontario databases to conduct some initial analyses. The study would use two basic treatments as units of study: burned and naturally regenerating landscapes, as well as harvested and naturally regenerating landscapes. If our findings show that naturally disturbed landscapes contain lower wildlife populations or lowered community diversity, then the objective of emulating natural disturbance should be changed to one of providing forest structure that maintains populations and community diversity. The preliminary analysis will lead to the development of predictive models, and an understanding of scales at which to measure effects.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Ian Thompson

Researchers
Ulf Runesson

161. Ancient Values, New Tools: A Framework For Addressing First Nations Cultural And Spiritual Values In Forest Management Using Integrated GIS/Landscape Visualization Technology.

Project sheppardsanci6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

This project will explore the role of new and emerging technologies in forest management for First Nations. Recent court decisions upholding the inherent right and title of First Nations to natural resources have placed First Nations at the forefront of resource management in British Columbia. First Nations are becoming increasingly involved with the use of GIS technology in both land claims and the management of resources. Emerging techniques involving computer-based visual information systems offer new ways to interact with landscape information and perhaps to understand more directly the deeply-rooted spiritual and aesthetic meanings of the landscape. However, little is yet known about how useful or acceptable these innovative tools are for different cultural groups, and whether they can help bridge cultural and educational differences. In this project we will: 1) Examine a case study literature of recent work in this evolving cross-disciplinary and cross-cultural area; 2) Assess the general utility of both emerging and low-cost computer visualization technologies; 3) Examine their specific utility on forest landscape planning initiatives; and 4) Develop a GIS/Visualization guidebook designed to facilitate a community-based landscape management/assessment framework. A second objective of this project is to develop a framework for capacity building by designing visualization training programs and developing supporting case study databases through collaborative partnerships across Canada and in the United States. This project will fill an often-overlooked gap in traditional knowledge research, namely, the role of spirituality, culture and aesthetics in First Nations resource planning and management.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Stephen Sheppard

Researchers
Gary Bull, *John Lewis*, *Madeleine MacIvor*, *Charles Menzies*

160. Attenuation Of Impacts By Forest Harvesting In Boreal Shield Lakes.

Project carignanratte6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

In a previous project designed to compare and model the effects of wildfires and clearcutting on water quality and mercury contamination in the boreal shield lakes of Haute-Mauricie (Qu?bec), we have found that clearcutting and fire had different effects. Compared to fire-affected lakes, logging-affected lakes received more coloured dissolved organic carbon (up to 3-fold) and their biota accumulated more mercury and methylmercury (2-fold). Methylmercury in zooplankton was directly proportional to dissolved oxygen content and inversely proportional to pH. In logged lakes, mercury levels in game fish consistently exceed the World Health Organization limit for safe consumption. The models issued from this study provide practical management tools, but are still crude and can be substantially improved. We will verify and refine our impact

models by applying a multi-year, replicated "before and after control/impact" study design to 30 new 20-50 hectare headwater lakes of Haute-Mauricie slated for logging in 2001-2002. In this project we will: 1) Verify that logging increases mercury levels in the biota, particularly in game fish, and provide quantitative impact models linking mercury contamination to watershed disturbance; 2) Validate and refine impact models in order to identify specific watershed properties influencing the impact of logging; 3) Assess the effect of buffer strips on water quality and mercury contamination in lakes; and 4) Establish the time scale of impacts by logging and fire on water quality. We now have four years of data for a first set of lakes (9 cut, 9 burned). Although water quality in these lakes is slowly returning to conditions observed in the reference lakes, a few more years of observation will be needed to fully characterize the response of affected lakes.

WHERE IS THE RESEARCH BEING DONE?
Quebec

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Richard Carignan

Researchers

159. Climate And Fire Relationships In The Central And Eastern Boreal Forest.

Project flanniganmclim6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

Climate and forest fires are intimately linked. As climate changes, fire regimes are altered, which may have significant impacts on the boreal forest. Any forest practice that attempts to emulate natural disturbance must take into account the role of climate on natural disturbance and in this case, forest fires. The relationship between climate and fire is dynamic and will continue to change as the climate changes. In this project, we will look at a fire regime/climate relationship over two time periods: the pre-industrial and the most recent 50-80 years. For the pre-industrial segment, we will use tree-ring climate analyses, together with existing and proposed fire history study areas that represent the last 300 years or so. For the more recent period, we will use provincial fire information for the last 50-80 years, along with meteorological observations. By using general circulation models and regional climate models, the relationships among fire, climate and vegetation can be used to estimate the impact of changes in the boreal forest in the 21st century, including the effect of the anticipated future warming on the fire regime. The results from this research can be incorporated into a fire succession model.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Mike Flannigan

Researchers
Yves Bergeron, *Brian Stocks*, *Jacques Tardif*

158. Colour Removal From Kraft Mill Waters By Ion Exchange.

Project buchananicolo6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

In this project, we will investigate the use of ion exchange resins to remove colour from pulp mill process water. The achievement of zero-liquid-effluent kraft pulp mills (also known as system closure) has long been an industry goal. These mills would not discharge contaminants to surface waters and would require significantly less make-up water for the pulping process. The current trend in the industry is toward progressive system closure through process modifications and treatment methods that allow the recycling of an increasing amount of the process water. Ion exchange has also been identified as a promising technology for use in the progressive closure of kraft mills. While ion exchange was identified as a possible means of colour removal from pulp mill effluents more than two decades ago, little if any research has been conducted in this area. This is no doubt due to the perceived high cost attributed to the treatment process. High treatment costs are mitigated in the case of technology that has the potential to also save costs by increasing process water recycling. Costs also become less of a limiting factor as effluent requirements become more stringent. Because the ion exchange resins will remove other non-process elements from the waste stream, this research is likely to also yield information useful for process water recycling, thereby reducing liquid waste and the need for fresh process water.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Ian Buchanan

Researchers

157. Combining Scientific And First Nation Knowledge For The Management And Harvest Of Traditional And Commercial Non-Timber Forest Products.

Project berkesfcomb6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

In this project, we will investigate the relationship between non-timber forest products and their appearance within different forest types and stages of development. This question will be investigated as a collaborative research project drawing upon both scientific and local knowledge of forests. The main objective is to design a model of collaborative research to investigate the ecological characteristics, and the traditional and commercial uses of forest plant diversity. Specifically, we will: 1. Develop research protocols and intellectual property rights agreements between research institutions and local communities; 2. Establish a system of plots to investigate non-timber forest products using both scientific and local knowledge; 3. Develop an ecological profile of specific non-timber forest products in relation to disturbance; and 4. Document the traditional and commercial uses of specific non-timber forest products. This project will produce a collaborative research model, a review of the public domain knowledge of the commercial uses of a selected set of non-timber forest products, and will examine the feasibility of constructing a predictive GIS model for non-timber forest products.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator

Fikret Berkes

Researchers

156. Cone Induction Of Residual White Spruce Seed Trees Using Gibberellin A4/7 (GA4/7): Influence On Squirrel Reproduction, Cone Predation By Squirrels And White Spruce Seeding Recruitment On Harvested Mixedwood Boreal Forest Sites.

Project boutinscone6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

Management of aspen and white spruce in the boreal forest for timber extraction is being conducted with the aim of also maintaining biological diversity of the plant and animal communities. The current management paradigm is focused on developing forest management systems that attempt to emulate the effects of natural disturbance and subsequent forest redevelopment. The harvesting and regeneration methods should, therefore, yield the mixed-species (aspen/spruce) forest that dominates the unmanaged landbase. The high variability in flowering and seed production of white spruce among years poses a significant challenge to successful natural regeneration of the spruce component of mixedwood forests. This research examines the hormonal induction of cone production in white spruce seed trees. Cone production can be successfully induced by injection of trees with a native conifer flowering hormone. Hormonal induction of flowering in trees which have shown fast growth and good form can help to ensure adequate regeneration of locally-adapted white spruce and will likely also reap benefits in terms of improved performance and yield in subsequent rotations. However, it is critical to determine the effects of stimulating localized "mast" crops of spruce cones on the population dynamics of the most important white spruce seed predator, the red squirrel. In turn, it is necessary to understand the potential feedback effects of cone predation by squirrels on the success of this system for achieving adequate natural regeneration of the spruce component of mixedwood boreal forests. We will quantify the impact of cone induction and consumption of female cone buds by female red squirrels on squirrel fecundity. Then, we will quantify the impact of cone induction on "attraction" of squirrels for trees and consequent impacts of cone predation on successful seed production in, and regeneration arising from, induced trees.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Stan Boutin

Researchers
S. Ellen Macdonald, Richard Pharis

155. Consequences Of Enhanced Tree Vigour On Bark Beetles.

Project reidmcons6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

To increase the amount of harvestable wood fibre, the forest industry would like to enhance the

growth rate and vigour of trees. Herbivores may be affected either positively or negatively by the change in tree growth rate, since the trees are expected to change in their nutrient quality and in their allocation to defences. Bark beetles, which breed in the inner bark of trees, may be affected by increased tree vigour. In this project, we will examine the response of two economically important species of bark beetles (Ips pini and Trypodendron lineatum) to increases in tree growth rate caused by thinning and fertilization of lodgepole pine stands. We will first establish the relationships between tree growth rate, the nutrients in the inner bark, and the defences in the inner bark for trees that have been thinned and/or fertilized. We will examine the performance of beetles in trees grown in thinned and unthinned stands by felling trees and measuring breeding success by naturally settling beetles and by beetles reared on sections of these trees in controlled conditions. We will similarly measure the success of beetles breeding in felled trees that have been fertilized. In addition, the success of beetles breeding in live fertilized trees will be examined. We predict that in freshly felled trees, beetles will be more successful (i.e., produce larger populations) when breeding in trees that had been growing more vigorously at the time of death because of higher nutrients and lower defences in the inner bark. The results of this study will determine the consequences of forest management practices to increase tree growth for bark beetles and other herbivores, and will suggest practices that may mitigate against population increases of pest species such as bark beetles.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Mary Reid

Researchers

154. Developing Better Probabilistic Function And Field Indicators Of Seedling Mortality Of Important Boreal Species Across The Canadian Boreal Forest.

Project messiercdeve6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

This project will provide a pan-Canadian comparison of the early dynamics of important boreal species. The actual causes of seedling mortality are poorly understood and not often studied, although they are crucial in understanding and modelling stand dynamics. The few studies that do exist are very local in nature and based on short-term post-disturbance data or retrospective analysis. Results may vary from one region to another. Industrial partners within the Sustainable Forest Management Network are often faced with apparent contradictions from the different regions where research is being undertaken, because of environmental differences and the ecology of the species present. We have therefore devised a protocol to repeat the same experimental layout at sites across the Canadian boreal forest from Chicoutimi to Alberta. This project will provide us with information to: 1) Validate and improve the current mortality functions for regeneration in different stand dynamics models, but specifically for SORTIE/boreal; 2) Validate and improve on our suggested morphological and growth indicators of vigour; 3) Better understand mortality rates of natural regeneration of different species under different light regimes and on different soil deposits; 4) Quantify variations in species specific mortality across regions and linkages between growth rates and mortality; and 5) Determine the season of mortality and the role of different factors in causing mortality. We will also link this work to other research on the dynamics of these species and eventually use it as a template to

create a comprehensive stand dynamics model that works across the entire boreal forest through a more complete understanding of the factors driving inter-regional differences.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Christian Messier

Researchers
Art Groot, *Norm Kenkel*, *Daniel Kneeshaw*, *S. Ellen Macdonald*, *Hubert Morin*, *Alison Munson*, *Jean-Claude Ruel*, *Geoff Wang*

153. Developing Early Indicators Of Productivity In Managed Forests: A Retrospective Analysis Of The Effects Of Silvicultural Practices Since 1970 In The Southwestern Boreal Forest Of Quebec.

Project leducadeve6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

Understanding how silvicultural practices affect forest dynamics (compared to natural disturbance) and recognizing early indicators of forest productivity is not only important for predicting stand development but also for predicting future forest conditions at the landscape level. Past and actual yield allocation in eastern Canadian boreal forests is based on the expectation that managed stands will grow and develop in the same way as natural forest stands. Our hypothesis is that future stand condition and development can be predicted by current regeneration characteristics, and that losses or gains in wood production can be related to past forest practices. This project addresses problems related to the evaluation of the quality of regeneration and growth, and the recognition of distal factors (silvicultural treatments, season of harvesting, etc) and proximal factors (light competition, soil nutrient depletion, etc) responsible for changes in stand productivity. More specifically, this project will: 1) Evaluate the usefulness of inventory data to provide accurate information on site and stand conditions and on past silvicultural treatments, in order to establish relationships among them; 2) Identify the best and the worst past silvicultural treatments used in relationship to specific site conditions and precut stand composition; 3) Identify mechanisms of competition that lead to regeneration failure; and 4) Recognize and predict cases of regeneration failure in the absence of competition. By the end of this project, we will be able to propose better silvicultural practices in terms of timing and mode of intervention, and validate and correct, if needed, current yield allocations. We will also participate in the development of a manual for monitoring regenerating stands.

WHERE IS THE RESEARCH BEING DONE?
Quebec

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Alain Leduc

Researchers
Yves Bergeron, *Suzanne Brais*

152. Developing Sustainable Non-Timber Forest Product Business Opportunities:

Is There A First Nations Advantage?

Project boxallpdeve6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

This project involves examination of the potential for some income-earning non-timber forest products in the Gwich'in Renewable Resource Board landbase area to be incorporated into the sustainable forest management plan. This examination will concentrate on foods, primarily berries, fungi, or other edible plants. The success of such an endeavour requires information on the following areas: 1. The existence of a market for non-timber forest products; 2. The ability of the local community to incorporate sufficient collection of non-timber products into their current uses of the forest to serve this market; 3. The ability of the forest to produce products at a level that generates an appropriate level of income without detriment to other forest outputs; and 4. The ability of the community to process, market, and distribute the product to potential consumers. The main research question to be examined in this research is whether a "market premium" exists for non-timber forest products produced by northern First Nations' communities. Community labelling can indicate that the product has been harvested and prepared by people who reside in First Nations' communities. Thus, this project is related to, and will further develop, the growing literature on product labelling as a vehicle to promote sustainable economic development. If such a premium exists for remote northern First Nations' communities, then market opportunities may exist for these communities to diversify their economics. Furthermore, if carefully managed, these opportunities might be integrated into traditional land use - in essence, economic development and traditional land use could be closely tied.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Peter Boxall

Researchers

151. Development And Experimentation Of Ecosystem Management In The Eastern Boreal Forest Of Quebec.

Project gauthiersdeve6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

Throughout its range, the boreal forest is subject to a highly variable disturbance regime. Understanding forest dynamics under a wide range of conditions is essential to develop silvicultural approaches adapted to regional realities of the boreal forest. In the eastern boreal forest of Qu?bec, forest fires are not frequent, so vegetation development may involve replacement of tree species or individual trees in the canopy. This disturbance regime contributes to the development of multicohort stands. Consequently, forest management should reflect this reality, by exploring alternative silvicultural approaches including partial cutting. This study will lead to better knowledge of the natural disturbance regime and the forest dynamics of the northeastern boreal forest of Quebec, in order to develop optimal silvicultural methods. More specifically, the project aims to: 1) Characterize the disturbance regime of the northeastern boreal forest and its influence on natural dynamics; 2) Describe the changes in species composition and structure of the forest stands; 3) Identify the time sequences and the factors associated with the

change from an even to an uneven age stand; and 4) Contribute to the development of silvicultural scenarios based on the comprehension of the natural dynamics of the northeastern boreal forest of Quebec. The ultimate outcome of this project will be the operational implementation of the approach to test the proposed silvicultural scenarios.

WHERE IS THE RESEARCH BEING DONE?
Quebec

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Sylvie Gauthier

Researchers
Louis De Grandpré

150. Development Of A Forest Management Strategy Based On Natural Disturbance For The Western Quebec And Eastern Ontario Black Spruce Ecosystem.

Project bergeronydeve6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

The appropriateness of the natural disturbance hypothesis for sustainable forestry partly depends on whether fires can account for a substantial fraction of the variability observed in forest composition. Our working hypothesis is that change in the composition of the forest mosaic, both in space and time, relates to changing disturbance regimes. In this project we will: 1) Characterize the fire regime of a large area of boreal forest in eastern Ontario and central Quebec. This will allow for a realistic estimation of the range of conditions for which boreal species are adapted, and will provide guidelines for a forest management approach based on natural disturbances; 2) Provide models that will allow us to predict vegetation composition in relation to fire regime both at the stand and landscape levels; and 3) Contribute to the development of a new approach to designing strategic plans that will allow forest managers to plan interventions that emulate forest mosaics that are similar to the ones created by natural disturbances. We will develop an empirical succession model using an analysis of permanent plots and ecological survey data from the Ministére des Ressources naturelles du Québec, together with detailed dendroecological field data. This model, together with the zonation provided by the fire history studies, will serve as basis for pilot studies aiming to incorporate natural disturbance and natural dynamics in the design of strategic planning. Possible consequences on allowable cut and operational costs will be assessed.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Yves Bergeron

Researchers
Sylvie Gauthier, Alain Leduc

149. Developpement D'indicateurs De Biodiversite Bases Sur Le Regime Des Perturbations Naturelles En Forêt Boreale Inferieure.

Project arseneaultddeve6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

Each Model Forest of the Canadian Model Forest Network is responsible for developing its own set of locally applicable, relevant indicators to measure its progress toward sustainable forest management. Indicators available to date for the evaluation of biological diversity are difficult and sometimes impossible to measure. This project is the first step towards developing new and highly efficient biological diversity indicators for the southern boreal forest. This project is based on the assumption that getting as near as possible to natural conditions would allow an optimal variety of plants and animals to coexist. Our project is separated into four major objectives: 1. Identification and description of the old-growth forest vegetation that could potentially develop in the absence of stand-replacing disturbances; 2. Estimation of the frequency of stand-replacing disturbances before and after settlement; 3. Identification of the most important ecological processes that have been acting on forest transformation after the introduction of logging activities in the studied landscape; and 4. Quantification of the compositional and structural differences between the precolonial and the present-day forest environments. These research objectives should generate the knowledge needed to develop metrics of human disturbance of the forest environment at the stand and landscape levels. We plan to translate these metrics into biodiversity indicators after calibration and validation using appropriate measures of biodiversity (to be obtained at a later stage).

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Dominique Arseneault

Researchers

148. Developpement D'un Scenario D'amenagement Forestier Ecosystemique Integrant Les Modes D'occupation Du Territoire Des Cris De Waswanipi (Que.).

Project bouthillierldeve6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

Biodiversity protection at a landscape level and harmonization of industrial forestry practices with Cree land use are two major challenges of integrated management of our boreal forests. Ecosystemic management defines new forestry practices based on natural characteristics of the landscape. Using this concept in a First Nation context would allow integrating sociocultural factors into forest management scenarios, while improving the protection of ecosystem biodiversity. The Waswanipi Cree Model Forest (WCMF) in Quebec offers a unique partnership opportunity between a native community, industry, government and researchers. The project will test the central hypothesis that an ecosystemic management strategy would be more compatible with Cree land use than current forestry practices. This relies on the assumption that Cree hunting, fishing and trapping activities, as protected under the James Bay and Northern Quebec Agreement (1975) have always taken place within a naturally disturbed environment. We will collect and synthesize knowledge on fire regime and natural forest dynamics in the area of Waswanipi. Then, through a collaborative learning process, some members of the Waswanipi

community will be asked to appropriate that knowledge and to develop new management scenarios. Collaboration between trappers and forest planners will allow applying the ecosystemic approach to a pilot area of 2000 km². An assessment framework for management options based on their technical, economic, environmental and social feasibility will be built in the process. We will identify, with the Cree community of Waswanipi, the potential contribution of the ecosystemic concept to better forest management practices. We will also develop, through a collaborative learning process, an ecosystemic forest management scenario adapted to the WCMF. The project will lead to forestry planning proposals that would be an adaptation of the actual Québecois forestry regime.

WHERE IS THE RESEARCH BEING DONE?
Quebec

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Luc Bouthillier

Researchers
Yves Bergeron

147. Directed Sampling Of Avian Indicators Of Forest Change: Refining Models And Sampling Methods And Identifying Species At Risk.

Project schmiegelowfdire6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

Resource use in Alberta's forested regions by various industrial sectors, primarily forestry and energy, has the potential to drastically alter the composition and structure of these forests and related biota. In recognition of the complexity of managing for single species, many forest companies are adopting a landscape approach to biodiversity management. Such a coarse-filter approach assumes that maintenance of suitable habitats and landscape structure, within some range of (natural) variability will result in conservation of biological diversity. However, it is necessary to identify and monitor measurable parameters (indicators) to check whether biodiversity objectives are being met. To be a useful management tool, a monitoring program must employ appropriate indicators, with established causal relationships to anticipated changes, and be statistically credible. Birds, by far the most diverse vertebrate taxa in the boreal mixedwood forest, are thought to be sensitive to various changes linked to resource development in these forests, and are a group for which survey techniques are well developed. This project will be a large, model-directed retrospective field study that builds on existing research, and will provide the rigour necessary to establish indicators, sampling and analytical techniques for boreal bird communities, as one component in the design of a robust biodiversity monitoring program. Field sampling will provide a direct test of existing predictive models of bird-habitat relationships, and of the parameter estimates used in assessment of effective sample designs. It will also identify those bird species most at risk and permit evaluation of activities at levels at which forest management planning takes place.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator

Fiona Schmiegelow

Researchers

146. Economic And Policy Issues In Achieving Sustainable Forest Management.

Project veemantecon6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

The overall objective of this project is to analyze key economic and policy issues relating, particularly at the macro level, to sustainable development in the northern boreal forest in Canada. Specific research objectives include: 1. Refinement and completion of sustainability indicators relating to "green" product (GDP) and environmentally-adjusted productivity; 2. Estimation and assessment of rates of return, both private and social, to forestry research; 3. Economic and policy assessment of why both productivity and research expenditures appear to have been lagging in Canada's forest sector, with policy recommendations for improvement; 4. Development and assessment of possible aggregate indicators of Aboriginal forestry participation and human capital formation, with specific reference to northern Alberta; and 5. Examination of important forest institutions - particularly property rights and tenure - which bear on sustainable forest management. This research focuses on socio-economic and policy analysis relating to defining, measuring, and operationalizing sustainability, particularly the question of adjusting forest sector output and productivity for environmental effects. Work on these macro-sustainability indicators leads to a very policy-oriented extension: the assessment of the rates of return to research in forestry. Plausible hypotheses being tested are that the rates of return to research in forestry have generally been low, but that social rates of return have been higher than corresponding private rates. The long run competitiveness and economic sustainability of the boreal forest sector is heavily dependent on the improvement of research levels and productivity growth (suitably environmentally adjusted) in the sector. We will also begin analysis of the issues relating to Aboriginal livelihoods, participation, and training in the context of boreal forestry.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Terry Veeman

Researchers
Martin Luckert

145. Economic Sustainability: An Assessment Of Criteria And Indicator Systems For Economic Components Of Sustainable Forest Management.

Project adamowiczvecon6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

The definition of sustainable forest management usually includes ecological, economic and social sustainability concepts. Ecological sustainability often relates to the resilience of the ecological system, its "integrity" and its ability to maintain production of ecological services.

Economic sustainability seems to be less well defined in the literature and in the criteria and indicator systems currently used. In this project, we will examine the concept of economic sustainability, the indicators that can be used to measure economic sustainability, the question of scale of the indicators, and the implications of using these indicators in terms of their incentive properties on economic agents. The result will be a critical assessment of economic sustainability indicators, construction of a suggested set of indicators, and presentation of such indicators for consideration in certification and monitoring processes. The project has three phases: Phase 1: We will develop a conceptual model of economic sustainability from the literature on sustainability and the literature on monitoring economic activity. Phase 2: We will examine current "criteria and indicator" systems for their consistency with the conceptual model outcomes. Phase 3: We will test a set of economic indicators, and the assessment of their properties, in at least one regional scale case study as well as a national level assessment. This project will link Sustainable Forest Management Network partners and the Model Forest Network in the assessment of economic sustainability criteria and the testing of proposed indicators.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Vic Adamowicz

Researchers
Peter Boxall, *William White*

144. Effects Of Intensive Management On Forest Structure, Composition And Understory Biodiversity In The Western Boreal.

Project macdonaldseffe6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

This project will examine forest structure, composition, and diversity of boreal forests, which have been intensively managed by commercial thinning (pine and spruce forest) and by retention of understory white spruce during commercial harvest of the aspen canopy. Our objectives are to: 1) Develop an understanding of the role of changes in above- (light) versus below- (water, nutrients) ground resources on composition and diversity of understory plants; 2) Develop an understanding of the influence of the treatments on forest dynamics and structure, including mortality, recruitment and evolution of coarse woody material, extent of development of understory trees, shrubs and non-woody plants; 3) Develop an understanding of the effect of these management practices on the species composition and diversity of understory plants; 4) Provide a data set for predicting the future successional development of sites which have been subjected to these management treatments; and 5) Provide a data set for predicting the influence of these management treatments on responses by animals (vertebrates and invertebrates). Field experiments will be conducted in the western boreal forest of Alberta. Stands, which were previously subjected to commercial thinning or harvesting with understory retention, will be examined and compared to unthinned and unharvested stands, respectively. In addition, field experiments will be established in which natural stands are assessed, then subjected to the prescribed treatments, and their development followed over time. The work will provide a comprehensive understanding of the influence of these intensive forest management treatments on understory plant diversity and on forest structure and composition, as relevant to wildlife habitat quality.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
S. Ellen Macdonald

Researchers
Cristina Mourelle

143. Environmental Endocrine Disruptors In Forest Industry Discharges.

Project halleenvi6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

An environmental endocrine disrupter can be thought of as an exogenous (from outside the body) chemical substance that can disrupt the normal functioning of the endocrine (hormone) system. Environmental advocacy groups, government regulatory agencies and some ecotoxicology researchers have linked the forest products industry to the endocrine disruptor issue. The general concern of these three groups is that aqueous discharges from the forest products industry may be affecting the normal functioning of the endocrine systems of fish in affected waters. One advocacy group has described the potential outcomes of exposure to endocrine disrupting chemicals (EDCs) as including " . . . smaller penises and/or testicle size, undescended testicles, lower sperm count, reproductive abnormalities, thyroid dysfunction, feminization of males or masculinization of females." The objective of this project is to undertake a critical review of the research literature on environmental endocrine disruption associated with forest industry discharges to answer the following questions: 1. Are forest industry discharges a significant source of environmental endocrine disrupting chemicals? 2. If so, what are the chemical constituents of forest industry discharges that should be considered to be candidate EDCs? 3. What do we know about the production, treatment and ultimate fate of these chemicals? 4. What are the gaps in our understanding of forest industry-related EDCs, and what research is needed to improve our ability to mitigate any significant EDC-type impacts from forest industry discharges? If warranted by the conclusions of the critical review of the literature, an integrated multi disciplinary research program would be developed for future years.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Eric Hall

Researchers

142. Environmental Evaluation Of Land-Applied Pulp Mill Biosolids: Monitoring Fate Of Sludge Constituents In Forest Ecosystems And Assessing Impact Using Ecologically-Relevant Organisms.

Project mccarthylenvi6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

Minimizing pulp mill discharges to surface receiving waters will result in an increase in bio-solids and sludge produced from the pulping process. Currently, bio-solids in the pulp mill industry are landfilled and incinerated, but both are expensive. Where technically feasible, agricultural, horticultural or silvicultural land application of pulp and paper mill wastewaters and sludge has been a viable option. While the high nutrient and carbon content of the bio-solids might offer significant benefits to soil productivity and tree growth, the long-term environmental impact of these disposal practices is unknown, and a potential problem. There is little information on the fate and impact of the bio-solid constituents themselves and a holistic environmental evaluation of the ecosystem receiving the bio-solids is needed. This project will address the knowledge gap while corresponding to the strategic direction the forest industry must take to meet upcoming regulations relating to bio-solids disposal. In determining the fate of bio-solids constituents and their impact on the forest ecosystem, and to assess the overall ecological impact of land-application of pulp mill sludge, we will: 1) Determine the acute and chronic impacts of applied bio-solids on soil ecosystems, using ecologically relevant bio-indicators and whole organism responses; 2) Examine soil and sludge microbial community structure before and after application of the bio-solids, looking for changes in species composition and their capacity for biodegradation; and 3) Evaluate the physical and chemical behaviour of the bio-solids constituents, including their potential for moving into surface receiving waters and leaching into ground water. Both laboratory-scale and field experiments will be used to evaluate the impact of land-applied sludge to forest soils.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Lynda McCarthy

Researchers
Elizabeth Edwards, *Roberta Fulthorpe*, *Peter Hodson*, *Stephen Liss*, *Trevor Stuthridge*

141. Experimental Study Of The Effects Of Forest Harvesting On Zooplankton Communities In Boreal Shield Lakes.

Project pinel-alloulbexpe6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

In the Canadian boreal forest, deforestation by wildfire or clear-cut logging is a major concern for the ecological integrity of lake ecosystems. Comparative study of the effects of wildfire and logging in boreal shield lakes provided clear evidence that fire and logging disturbances have different impacts on nutrient export from drainage basins, lake water quality and plankton communities. In this project, we will determine the responses of zooplankton to experimental intensive harvesting of boreal shield lakes, in relation to increases in nutrient and dissolved organic carbon concentrations, water colour, and attenuation of light with depth. Experimental harvesting of drainage basins will be carried out in 20 boreal shield lakes over the next three years in collaboration with industrial partners. We expect to find that: 1) Increased water dissolved organic carbon and colour will increase the biomass of microzooplankton, detrimental to the macrozooplankton; 2) Change in lake thermocline depth will modify vertical distribution patterns of zooplankton in aphotic and photic zones, by depriving macrozooplankton from deep clear and oxygenated refuge against planktivores, and decrease zooplankton diversity; and 3) Increased microzooplankton biomass will promote the development of invertebrate predators, such as carnivorous cyclopoids and chaoborids. A shift after forest harvesting from macro- to

microzooplankton dominance, and a higher biomass of invertebrate predators would lengthen the pelagic food chain, resulting in a decrease in efficiency of carbon transfer and fish growth, and an increase in transfer of contaminants (methylmercury) to fish. In a further study, we will explore the ecological mechanisms involved in lake zooplankton responses to clear-cut logging, and learn more about the links between changes in plankton communities and the higher transfer of methylmercury observed after forest harvesting.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Bernadette Pinel-Alloul

Researchers

140. Factors Influencing Kraft Pulp Mills When Reducing Impacts Of Effluent Discharge.

Project smithdfact6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

This project will examine the factors influencing the development of effluent standards for the kraft pulp industry, and suggest new institutional arrangements that may be more effective in proactively addressing new impacts. We will first investigate the historical evolution of effluent standards and potential links to endocrine disrupter issues. This phase will be based on literature reviews and extensive interviews with representatives of regulatory agencies, the pulp industry, non-governmental organizations, First Nations and others. This information will help define the effects and interactions of various factors that influence pulp mills when they set out to reduce effluent discharges by making technology improvements. In the second phase of the project, we will investigate the wide variety of institutional arrangements (including commissions, private/public research institutes, government agencies, industry technology centres and resource boards) currently used to identify new science and in developing standards. Each institutional arrangement will be evaluated and ranked for effectiveness and appropriateness to the forest industry. In the final phase, we will recommend several alternative institutional arrangements that will effectively incorporate new science and proactively develop standards to minimize environmental impacts from the forest industry.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Daniel Smith

Researchers
Vic Adamowicz

139. Fire History Reconstruction And Response Of The Dominant Tree Species To Climate In The Duck Mountain Ecoregion, Western Manitoba.

Project tardiffire6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

Public concerns about forest management practices have been growing in the past decades. New tools are needed to better manage our forests, not solely for timber purposes but also for other aspects related to soil and water conservation, biodiversity and wildlife conservation, and other values. This project intends to provide forest managers and researchers with a better understanding of natural disturbances in the Duck Mountain ecoregion. We will fill a gap in our knowledge of forest dynamics by better understanding the natural disturbance regimes in the Duck Mountain ecoregion. We believe that if forestry practices were to better mimic natural disturbances, better management of our forest would result. To fulfill this objective, we will reconstruct the fire history of the Duck Mountain ecoregion for the last 150 years using archives and aerial photographs, as well as an extensive dendrochronological study of the area. This will allow us to increase our understanding of fire behaviour on the landscape. Other disturbances such as insect outbreak episodes will also be investigated. The factors influencing fire behaviour at the landscape level will be identified through locating and sampling old-growth forest in the ecoregion. We will also look at the effect of regional climate on tree growth and how climate change can influence the future forest. The fire reconstruction will be very useful to establish maps of stand age and initiation age. These data will also be added to the present knowledge of the Canadian boreal forest by comparing disturbance regimes across a gradient from central Canada to eastern Canada.

WHERE IS THE RESEARCH BEING DONE?
Manitoba

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Jacques Tardif

Researchers
Edward Cloutis

138. Fire Ignition And Extinction In Dedicuous And Coniferous Fuels.

Project johnsonefire6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

Deciduous fuels and coniferous fuels are believed to differ in their effects on fire behaviour in the mixedwood boreal forest. In particular, aspen fuels are seen to be a low flammability fuel type. To the extent that this is true, landscape-level fuel management can be used as a means of facilitating fire prevention and suppression. We will test the hypothesis that aspen fuels show lower ignition probabilities and higher extinction probabilities than conifer fuels. Little to no work has been done on fire ignition and extinction despite their control over fire frequency, spot-fire initiation, and fire size. Because ignition and extinction primarily occurs on the forest floor, we expect variability in forest-floor fuel characteristics (e.g., moisture content, thermochemical properties, fuel loading) to be largely related to variability in the vegetation. Because vegetation characteristics have been shown to be determined by fire history, surface type, and hill slope position, we will sample in this context in order to capture the natural range of variability seen in ignition and extinction behaviour in the mixed-wood boreal forest. Ignition trials will be conducted in the laboratory; extinction will be measured by small-scale experimental fires in the field (1 x 3-metre plots). This project will provide a scientific basis for fuel management designed to facilitate fire prevention and suppression. The products of this study will include a

fire ignition index and extinction probabilities for mixedwood boreal fuels over the natural range of fuel moisture contents.

WHERE IS THE RESEARCH BEING DONE?
Saskatchewan

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Ed Johnson

Researchers

137. First Nations' Strategies For Sustainable Forest Management.

Project graftonrfirs6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

Many First Nations communities suffer from a lack of economic opportunities. Insufficient access to natural resources, scarcity of skills necessary to develop economic opportunities, and distance from other communities are all barriers to their development. If First Nations are to meet the needs of their communities today, and into the future, they must develop strategies for sustainable development that build upon their human capital and use the natural capital, which has, for so long, provided for their welfare. This project is designed to develop tools for First Nations to undertake the analysis and implement programs that would lead to sustainable development and sustainable forestry practices. We will: 1. Quantify the socio-economic needs of the Little Red River / Tall Cree Nation (LRR/TC) today, and project their needs up to 15 years in the future; 2. Identify the institutional need, tools and technical support required by the LRR/TC to implement sustainable forestry practices and undertake sustainable development; 3. Develop a set of system dynamic models to assess the capacity of the forest base and other natural and environmental resources to provide for the needs of the LRR/TC under various uses, and alternative management practices; 4. Translate these researcher-developed models into a framework that can be used by the LRR/TC; and 5. Develop a process to help other First Nations elaborate and evaluate sustainable forest management strategies.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Ilan Vertinsky, **R. Quentin Grafton**

Researchers
Christopher Findlay, *G. Cornelis van Kooten*

136. Identification Of Ecological Thresholds In Silvicultural Intensity Using Avian Indicators.

Project villardmiden6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

Over the past 15-20 years, intensive silviculture has modified the forest landscapes of New Brunswick, with the gradual conversion of mixedwood stands into conifer plantations and

selection cutting in hardwood stands. The native flora and fauna can withstand moderate alterations of the forest landscape, but silviculture can become too intensive to be compatible with the conservation of biodiversity. The general objective of this project is to determine the range of intensity at which silviculture compromises the viability of forest bird populations and their associated ecological processes (e.g., predation on spruce budworm and other defoliating insects). Most species of forest birds can persist and reproduce successfully in landscapes that maintain a high proportion of uncut stands; the question is, do breeding populations disappear relatively suddenly as silviculture is intensified and an increasing proportion of the landscape is harvested? To answer this question, we will sample birds at stations covering a range of silvicultural intensities. At each station, we will: 1) Record the presence and abundance of forest bird species; 2) Determine whether or not these species show signs of reproductive activity; and 3) Determine whether the Pileated Woodpecker, a large snag-dependent species, is present and look for recent signs of foraging.

WHERE IS THE RESEARCH BEING DONE?
New Brunswick

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Marc-André Villard

Researchers

135. Indicators Of Sustainable Forest Management: Developing A Process For Implementation In A Case Study Of Certification In The Mauricie Region Of Quebec.

Project munsonaindi6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

In recent years, numerous efforts have been made to develop pertinent criteria and indicators of sustainable forest management that could be used as a basis for certification. In Quebec, several industries are pursuing certification using different systems; for example, Abitibi-Consolidated Inc. has incorporated the six Canadian Council of Forest Ministers (CCFM) criteria into their ISO-14001 system for forest management. However, more effort is needed to concretely link scientific knowledge, forest data, and public concerns directly to integrated forest management plans. The objectives of this project are to develop and test indicators on a public forest territory managed by Abitibi-Consolidated Inc. in the Mauricie region of Quebec that is certified ISO-14001. Starting from local values and indicators, we will evaluate the current status of this forest, as well as current issues and strategies to be discussed by the public and industry in a local workshop. Using results of the workshop, we will revise or refine the indicators and identify pertinent management objectives. The indicators will be practically applied and integrated into a five-year management plan. Finally, we will simulate the implementation of management practices using these objectives as guidelines. Based on criteria defined by the CCFM, knowledge from the Quebec Integration project (see Kneeshaw et al.), and issues identified by forest managers from Abitibi-Consolidated Inc., we will address 1. Biodiversity (maintenance of ecosystem and species diversity); 2. Ecosystem productivity (annual possibility); ? Soil conservation (soil fertility); 3. Water conservation (water quality); 4. Multiple benefits (game hunting); and 5. Societal responsibility for sustainable development (sustainability of supply and demand for timber, and maintenance of forest health).

WHERE IS THE RESEARCH BEING DONE?
Quebec

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Alison Munson

Researchers
Jean Bégin, *Louis Bélanger*, *Luc Bouthillier*, *Marcel Darveau*, *David Paré*, *André Plamondon*, *Jean-Claude Ruel*

134. Influence De La Mosaïque Forestière Présente Et Passée Sur La Sévérté Des Épidémies De La Todeuse Des Bourgeons De L'Épinette Dans La Zone Boréale.

Project morinhinfl6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

In eastern North America, the spruce budworm is the most important forest devastating insect. Along with fires, this natural disturbance is the principal cause of loss of wood fibre in Canada. For fires, detailed maps of recent and past events established from historical statistics and dendroecology are available for large areas, permitting the use of spatial and temporal dynamics to suggest some forestry exploitation models based on natural disturbance. However, while we have some spatial and temporal dynamic information for the last spruce budworm epidemic, no equivalent information is available for past epidemics. This project follows directly from results of a previous project on the spatio-temporal dynamic of epidemics of the spruce budworm in the boreal forest. The frequency of epidemics was found to be very regular, occurring on average every 33 years. Every epidemic is unique in its spatial and temporal development, but epidemics that spread rapidly and whose impact is synchronized on vast territories are those that have the greatest impact. We hypothesize that the forest mosaic is an essential component to explain the impact of epidemics of the spruce budworm. When an epidemic occurs, the impact on the forest mosaic will determine the future forest composition and impact of future epidemics. The objectives of this work are to study the importance of the forest mosaic on the impact of epidemics of the spruce budworm for the most recent epidemic and for past epidemics in the 20th century.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Hubert Morin

Researchers
Yves Bergeron, *Daniel Kneeshaw*, *David MacLean*

133. Integrated Fire And Forest Management In The Boreal Forest.

Project martelldinte6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

In this project, we will use decision analysis methods to develop a formal methodology for describing and evaluating: 1. Integrated fire and sustainable forest management policies; and 2. Strategies for flammable boreal forest landscapes that have the potential to provide an economic supply of industrial wood fibre and that support healthy wildlife populations. We will study the effectiveness of "fire smart" forest management practices at reducing area burned and determine the return on investment of such practices relative to timber supply. We will also investigate the impact of these strategies on wildfire habitat. Our study will include both spatial and aspatial analysis and will be conducted on two considerably different forest management units. Our objective is to further understanding of integrated fire and forest management planning. In doing so, we will develop decision support systems that can be used to enhance the ability of fire and forest managers to work together to develop, evaluate, and implement integrated fire and forest management policies and strategies that will contribute to the sustainable management of the boreal forest of Canada.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
David Martell

Researchers
Kelvin Hirsch, *Jay Malcolm*, *Robert McAlpine*, *Andreas Weintraub*

132. Integrating The "Ecosystem Management Emulating Natural Disturbance" (EMEND) Experiment.

Project spencejinte6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

The EMEND umbrella seeks to integrate work of ecologists, foresters, economists and sociologists to optimize how harvest and regeneration of mixed-wood forest can be effectively modeled on natural disturbance regimes across the boreal region of Canada. Our overall objectives are to: 1) Determine how forest harvest and regeneration can maintain biotic communities, spatial patterns of forest structure and functional ecosystem integrity comparable to mixedwood landscapes that have arisen through wildfire and other inherent natural disturbances; and 2) Evaluate these practices in terms of economics, sustainability and social acceptability. We will pursue the objectives through a multi-agency harvest-silviculture experiment northwest of Peace River, Alberta, coupled to analytical and predictive modelling to be developed and generalized in collaboration with researchers across Canada. Through the EMEND experiment, we will provide sound guidance about building biodiversity considerations into forest management by establishing how the biodiversity of a range of animal and plant taxa is affected by a range of operationally feasible forestry practices (continuing work); and how biodiversity can best be valued in relation to economic factors and socio-political desirables (work just initiated). Over the next three years, we will develop carbon-dynamics and climate change components to EMEND (work planned and proposed) and integrate with other Sustainable Forest Management Network research and the relevant Canadian Forest Service Networks. EMEND research will support forest industry responses to the two paramount ecological and socio-political challenges of the day.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
John Spence

Researchers
Vic Adamowicz, *Suzanne Brais*, *Victor Lieffers*, *S. Ellen Macdonald*, *Ken Mallett*, *W. Volney*

131. Integration Of Forestry And Oil/Gas Policy Regimes: Opportunities And Constraints.

Project davidsondinte6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

This project will analyze the provincial policy regimes of forestry and oil and gas to describe opportunities and constraints to integrated resource management in Alberta. Our primary method is comparative analysis of policy documents, supplemented with interviews with key informants in federal and provincial government institutions, industry, NGOs, First Nations, and members of the affected communities. Our research questions are: 1. To what extent does the regulatory regime applicable to oil and gas developments differ significantly from that applicable to the development of forest resources? 2. Are these policy regimes sufficiently compatible to allow effective integrated management? 3. What are the primary social and political factors inhibiting or encouraging integrated resource management? 4. How can forest policy and oil and gas policy be reformed to improve the potential for integrated land management practices? This project will reveal the extent to which resource management strategies are constrained by existing provincial institutional arrangements, and the potential for institutional change. This project will also examine the degree to which different policy implementation strategies have varying levels of impact on both social communities and local ecosystems, with particular focus on integrated resource management.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Debra Davidson

Researchers
Naomi Krogman, *Monique Ross*

130. Integration Of The EMEND And SAFE Projects: Successional Pathways And Forest Processes In The Boreal Mixedwood Of Canada.

Project spencejinte6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

The EMEND umbrella could provide infrastructure and scientific momentum to integrate broad, site-specific studies in forest ecosystem management across Canada. As a first step, we will compare basic ecological patterns and processes between well studied forest ecosystems by networking efforts of two strong research groups: the EMEND (NW Alberta) and the SAFE (NW Quebec) projects. These projects are multi-disciplinary, involving several research agencies. The projects are built around forestry experiments that apply harvest treatments varying in canopy

removal, and involve stands of similar species composition, but that have developed in different landscape and historical contexts. Both projects were planned and initiated in direct response to forest industry and government interest in ecological issues of importance to sustainable forest management. Both projects are committed to applying ecological knowledge of how mixedwood forests are affected by harvest and regeneration practices to forest management, in the context of the natural disturbance paradigm, and as tempered by socio-economic considerations. We plan to formalize linkage between the EMEND and SAFE projects through a joint effort to characterize and compare properties of undisturbed stands in both regions. This will lay the basis for further comparisons between the eastern and western parts of the boreal mixed-wood region in terms of stand dynamics and resilience following disturbances. Furthermore, formal linkage of the two projects will achieve and foster intensive networking among researchers, students, governments and industrial partners, as required to integrate and apply research work across regions.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
John Spence

Researchers
Yves Bergeron, *Suzanne Brais*, *Victor Lieffers*, *Christian Messier*, *W. Volney*

129. Interaction Of Forest Management And Wildfire On The Landscape Mosaic.

Project johnsoneinte6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

If forestry is to mimic natural processes, we must also know how forest cutting and settlement clearance interact with these natural processes. Rarely will natural processes like wildfire be completely replaced by forestry practices. In this project, we will add to the knowledge about how the interaction of logging and wildfire create the landscape age mosaic. We will work in northern Ontario in a region subject to settlement fragmentation, wildfire and various logging practices over the last 90 years. This area has had time to be completely subject to cutting and settlement. There is much speculation about the kind of age mosaic that forest management will produce, but there is no empirical evidence as to what it actually looks like. The purpose of this project is to collect this evidence. We will collect spatial data on fire, logging and settlement, and then develop a method of analysis to evaluate the interaction of these variables on the landscape age mosaic. The model should allow us to create a tool for estimating both the naturally caused and forest-operations-caused variation in age of the landscape. This will allow evaluation of forest management practices of the mimicking natural disturbance hypothesis.

WHERE IS THE RESEARCH BEING DONE?
Ontario

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Ed Johnson

Researchers
William Reed

128. Land Use Intensity And Forest Cover Change: Effects On Community Composition Of Birds In The Boreal Forest.

Project hannonsland6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

The global objective of this project is to understand the relationship between land use intensity/land cover change and biodiversity changes in the boreal forest and to develop indicators of these for biodiversity monitoring. Our specific objectives are: 1. To determine how to measure land use intensity; 2. To determine how bird community composition changes with changing land use intensity and overall land cover change; 3. To determine how well we can predict species presence/abundances from remotely sensed information; and 4. To use this information in landscape planning in a regional context to conserve intact bird communities and conserve species at risk of declining due to landscape change. We will use eight study areas in boreal forest, where we currently have bird census data collected, that have been burned, logged, or have agriculture or are intact except for low level seismic activity. We will subsample sites from these to give a range of forest cover and a range of different landuse activities. Then we will determine gaps in the range of variation and do further sampling as necessary in the field. By conducting a gradient analysis of forest cover change and landuse intensity, we hope to identify which species' might be disappearing (i.e., sensitive species). We will then attempt to construct an index of biological integrity for forest species in conjunction with the biodiversity group.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Susan Hannon

Researchers

127. Landscape Issues In Sustainable Forest Management: Statistical Methods And Tools For Projecting Consequence Of Management Actions.

Project bunnellfland6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

Strategies for sustainable forest management require knowledge about the potential economic and ecological outcomes of policy decisions and management actions. Landscape simulation tools, when parameterized with relevant data, are well suited for use in integrated resource planning, scenario evaluation and policy analysis. Two modelling platforms have been developed -- FEENIX and TARDIS -- and are designed for simulating forest harvesting, wildfire, stand dynamics, and wildlife habitat and population dynamics in boreal forests. Our primary goal is to contribute to the continued development of an integrated suite of models of landscape dynamics of the boreal forest, for use in management scenario evaluations and policy analysis, and in the formulation and exploration of new hypotheses about landscape dynamics. Our research will concentrate on parameterization of the fire model to examine harvesting/fire interactions, validation and generalization of existing habitat-based wildlife models, estimation of movement parameters for individual-based models of forest birds, and integration of FEENIX with existing

GIS tools. Our specific objectives include: 1) Quantifying the effect of forest age on fire spread probabilities; 2) Improving statistical models of fire suppression effectiveness, and develop models of the influence of harvesting patterns on fire ignition and spread; 3) Validating existing habitat-based, bird species models with local data sets from other areas of Alberta, British Columbia and Manitoba with data from the model-directed sampling initiative; 4) Estimating the movement parameters for select forest bird species for use in individual-based models; 5) Calibrating FEENIX for inclusion of population dynamics and individual-based modelling of forest birds; and 6) Facilitating technology transfer by integrating FEENIX with existing GIS and forest planning tools.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Fred Bunnell

Researchers
Fiona Schmiegelow, *Carl Walters*

126. Large-Scale Issues Of Sustainable Forestry: Wildlife Habitat Modeling And Biomonitoring.

Project schmiegelowflarg6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

Effective wildlife conservation in forested landscapes managed for multiple objectives increasingly relies on models to predict the outcome of alternative management scenarios on the distribution and abundance of focal species or groups. Habitat models based on remotely sensed data such as forest inventories or satellite imagery are inexpensive to develop compared to models based on detailed vegetation. Once developed and validated, such models can be linked to landscape simulation models to evaluate the consequences of alternative management activities and policies over large spatial and temporal scales. Our primary goal is to contribute to the development of an integrated suite of models for use in management scenario evaluations and policy analysis, and in the formulation and exploration of new hypotheses. The research will concentrate on habitat-based and demographic wildlife modelling, the identification of biodiversity indicators, and the design of biomonitoring programs. Our objectives include: 1) Quantifying the effect of various linear developments (type and density) on forest landscape metrics and associated habitat values for incorporation into our habitat-based models; 2) Exploring the conceptual and methodological issues of applying community-level and multi-metric indices of ecological integrity to forest biomonitoring programs; 3) Developing an understanding of variability in forest succession and habitat values in response to disturbance (harvesting and fire), for incorporation into habitat-based models; 4) Developing a population model of caribou in west-central Alberta, with evaluations of management scenarios in relation to caribou population viability; 5) Expanding biomonitoring simulation models to taxa other than birds; 6) Using model-directed sampling to guide field research to test and refine the variance estimates used in the assessment of monitoring program effectiveness, and refine habitat-based wildlife models; and 7) Developing wildlife

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Fiona Schmiegelow

Researchers
Vic Adamowicz, Jim Beck

125. Modeling Effects Of Climate Change And Mitigative Management Strategies On The Carbon Dynamics Of Boreal Forest Ecosystems In Western Canada.

Project pricedmode6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

Few studies of climate change impacts on Canadian forests have focused on managed boreal systems. Recent studies indicate that predicted environmental changes could increase or decrease productivity, depending on site location, but overall impacts could be beneficial. On the down side, however, rates of decomposition of organic matter in soils, peats and forest litter layers are likely to increase, causing significant overall reductions in ecosystem carbon storage (and greater releases to the atmosphere). These interacting effects are likely to cause changes in forest structure - with major consequences for timber supply and other forest benefits, including carbon storage. Significant areas of Canada's boreal forests are being harvested and therefore under scrutiny as possible carbon sources. This study addresses two important questions: 1. Are managed forest stands in the western boreal more or less likely to release carbon than unmanaged stands? 2. Can forest management be used to mitigate carbon emissions at the national and global scales? Recent research results suggest there is potential for management to retain forest ecosystem carbon under a changing climate, without greatly affecting timber supply. The big unknown, not considered in these studies, is the changes in disturbance regime (fires and insect attacks) that are expected with a warmer climate. Nor have these studies considered differences between upland and lowland (wetland) boreal sites. We will investigate possible responses of managed boreal forests to climate, and to assess the potential for management to mitigate negative impacts of change, while maximizing any benefits, using two models. The approach will focus on forested regions already under management, taking advantage of data available from several other studies.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
David Price

Researchers
Ross Wein

124. Modeling Impacts Of Forest Management And Climate Change On Forest-Peatland-Lake Carbon Stores And Fluxes.

Project vittdmode6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

Our target is the development of a decision support system for landscape-level carbon storage. We have identified databases of existing knowledge and identified data deficiencies. The

resulting knowledge and understanding of forest-peatland-lake carbon dynamics will feed into the development of models. In previous work, we have asked and answered four main questions: 1. How much carbon presently stored in dead matter in each of the forest, lake, and peatland systems? 2. How much carbon is stored in living matter in each system? 3. How is this carbon distributed on the western Canadian land base? 4. What are the dynamics of carbon transfers between these systems and how are they affected by natural disturbances? Clear deficiencies in our knowledge base must be remedied, and we will address those through an integrated and highly targeted research program. The major deficiencies are in the area of acrotelm processes in peat, and the impact of disturbances on peatland carbon dynamics. Work in the current year will be towards developing an understanding of the forest management options that are presently available, and the regulations and international agreements that may affect those options. This work will allow us to begin developing a landscape carbon decision support system to be used by forest managers.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Dale Vitt

Researchers

123. Modeling Spatial And Temporal Economic Activity In Forested Landscapes: Forest Management, Non-Timber Values, Habitat, Wildlife, Access, Cumulative Effects, Disturbance, Recreational Use, Subsistence Use And Human Dynamics.

Project adamowiczvmode6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

Most analyses of multiple use or integrated resource management contain relatively simple representations of human spatial economic behaviour. To understand human impacts on the environment, and the impacts of changing environments on non-timber values, the interaction between ecological and economic sectors must be better represented. In this project, we will: 1) Develop a spatially explicit model of human resource use including recreational and subsistence uses of wildlife resources, disturbance and the interaction between human disturbance and fish/wildlife resources; 2) Employ this modelling approach in evaluating non-timber values, and develop indicators arising from these values; 3) Develop the relationships between access, resource use and spatial economic behaviour. These relationships are key elements in the interaction of forestry, energy sector use of forests, wildlife and human use; 4) Develop the human use sector so that the impact of regulatory changes can be examined (regulation structure, regulatory effort, etc.) and that effort can be made to determine optimal regulatory structure (enforcement, monitoring, etc.); and 5) Contribute to the construction of a modelling tool that includes economics effects. The primary modelling platform for this project will be FEENIX as this structure supports ecological information necessary for the development of the ecological-economic interaction models. This project will improve our understanding of spatial economic behaviour for three sectors: forestry, fish and wildlife resource users, and the energy sector.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Vic Adamowicz

Researchers
Glen Armstrong, *August Lee Foote*, *Grant Hauer*, *Fiona Schmiegelow*

122. Models For Sustainable Fisheries In Boreal Shield Lakes Impacted By Forest Harvesting.

Project magnanpmode6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

In a previous project, we investigated the impact of wildfires and logging on abundance, growth and size structure of fish populations in 38 boreal shield lakes (the watersheds of 20 of these were not affected; nine were logged and nine had wildfires). This project showed that the proportion of small yellow perch and white sucker were significantly lower in populations of affected lakes: wildfires and logging together explained 19.5 percent of the variation in abundance of small yellow perch and 24.1 percent of small white sucker. These mortalities are likely to have a cascading effect on the most valuable exploited species like northern pike and walleye, which use perch and sucker as forage fish. In this project, we will concentrate our efforts on logged lakes, to determine the impact of logging on relative abundance and size structure of fish populations, especially on their first cohorts. Specifically, we will: 1) Test the hypothesis that logging reduces fish recruitment; 2) Determine if logging has any other effects on fish populations; 3) Determine if the changes in fish populations are correlated to changes in any lake characteristics following logging; 4) Verify any relationship between the level of deforestation and the amplitude of changes in fish populations; and 5) Build simple empirical models to predict the amplitude of changes in fish populations following different levels of deforestation. These models will enable managers to propose cutting and fish exploitation regimes that will allow both forest harvesting and sustainable fisheries. We will investigate these questions by comparing response variables before and after logging in 30 new 20-50 hectare lakes located in the Haute-Mauricie (Réservoir Gouin area, Québec).

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Pierre Magnan

Researchers

121. Multiscale Landscape Indicators Of Forest Bird Diversity And Community Structure.

Project rempelrmult6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

The maintenance of forest vertebrate diversity is an important component of an integrated approach to ecological resource management. The bird community of the Duck Mountains has adapted to the patterns and rhythms of natural forest disturbance. Changing the landscape

configuration and composition of the forest overstory may have effects on this important component of the native biodiversity. To provide reasonable assurance that forest management practices will not put this vertebrate community in danger, managers need to determine the thresholds at which changes in landscape structure and overstory composition will affect the bird community. Such information can then also be used to develop predictive models of how bird communities will respond to future forest conditions. Previous studies have opened a debate concerning the relative effect of landscape configuration versus habitat amount on forest vertebrate communities. The question of "habitat configuration" versus "habitat amount" is central to current research addressing the effects of forest management on biodiversity. In this project, we will: 1. Relate forest bird community structure to landscape pattern and composition, and test for changes; 2. For individual species, determine thresholds at which landscape pattern and composition are associated with a change in habitat occupancy; and 3. For individual species, create spatially explicit abundance (and variance) maps of bird distribution to describe and test for spatial relationships with landscape structure, landform patterns, and topography.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Robert Rempel

Researchers
Margaret Donnelly

120. Old-Growth Attributes In Intensively Managed Forests: Integration Of Stand Productivity With Mammal Diversity.

Project sullivantold-6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

Managing and conserving forests for biological diversity has become a major objective for forested landscapes in North America. This objective may be achieved by a combination of practices that provide a variety of forest successional stages (including old-growth), tree species, stand structures, and silvicultural treatments in a mosaic of habitats across a landscape. The greatest opportunity to diversify forests for the future may lie in the vast areas of young second-growth stands that are amenable to silvicultural practices to accelerate ecosystem development. Heavily thinned lodgepole pine stands appear to develop some old-growth structural attributes such as large diameter trees, crowns, and structurally diverse vegetative communities. Responses of forest floor and arboreal small mammals, in terms of population dynamics, will be evaluated by intensive live-trapping. We will evaluate habitat use by mule deer by counting fecal pellet groups in permanent plots during summer and winter periods. Our research will address three areas: 1. Will development of old-growth structural attributes in thinned stands provide suitable habitat for red-backed voles and northern flying squirrels as determined by population dynamics (abundance, reproduction, and survival), and for mule deer as determined by winter range habitat use? 2. Will development of old-growth structural attributes be most enhanced in heavily thinned as compared to lightly thinned stands? 3. Will mammal diversity in the forest floor and arboreal groups in the heavily thinned stands be comparable to that in old-growth forest?

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Thomas Sullivan

Researchers

119. Predator-Prey Dynamics Of Forest Tent Caterpillar As An Indicator Of Forest Integrity.

Project rolandjpred6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

This project examines the effect of altered forest structure on the predator-prey dynamics of the forest tent caterpillar and its natural enemies (parasitoids and disease). Because its dynamics are affected by forest structure, results of this study will provide indicators of the types of forest structure which de-couple tent caterpillar from their natural enemies, thereby altering the normal regulation of this defoliator. Our approach actually has two utilities: 1. Biomonitoring of the integrity of an ecological process (predator-prey dynamics); and 2. A tool for minimizing impact of defoliator populations. In the case of biomonitoring, industry could assess the integrity of the forests for tent caterpillar regulation using LANDSAT imagery. We would provide the parameters of landscape that would have to be exceeded for normal regulation of this keystone defoliator to occur. In the case of pest management, we could provide similar landscape parameters associated with reduction in the impact of forest tent caterpillar. In doing so, there is the option of managing for both biological integrity and for pest management, both of which are interconnected.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Jens Roland

Researchers

118. Predicting The Susceptibility Of Surface Waters To Changes In The Boreal Forest: Towards An Adaptive Forest Management Tool.

Project creedipred6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

Before we can predict the impact of changes in the boreal forest on lakes, we must understand the natural variation in lake dynamics. In the boreal forest, there is substantial natural variation in the primary production of lakes. Our recent research points to landscape position as a significant source of this natural variation. A lake's landscape position is defined by factors that include lake order, lake elevation, the recharge versus discharge nature of the lake, mechanisms of runoff generation from upland and lowland areas to the lake, and the distribution of contributing source areas of nutrients within the drainage basins. To test this conceptual model, a major task is to identify the contributing source areas of nutrients that may limit primary production of the lake. This project will establish the potential for hydrologic flushing of nutrients to boreal lakes and explore links between hydrologic flushing, lake nutrient status and food web processes. Specifically, we will: 1) Quantify the range in potential for hydrologic flushing of nutrients to

boreal lakes; and 2) Explore links between the hydrologic flushing of nutrients to boreal lakes and the nutrient status and food webs of these lakes. This project develops our conceptual model for predicting the potential susceptibility of lakes to changes in the boreal forest, which will ultimately lead to an important tool for adaptive forest management.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Irena Creed

Researchers
Kevin Devito, William Tonn

117. Recruitment Dynamics Of White Spruce And Balsam Fir Advance Regeneration In Trembling Aspen Stands, Duck Mountain, Manitoba.

Project kenkelnrecr6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

The boreal forest of the Duck Mountains in Manitoba is an important resource that provides timber, conservation and wildlife values. These forests are ever changing: trees grow and eventually die, to be replaced by other trees in a process known as succession. Because trees are long-lived, the study and understanding of forest succession is difficult and challenging. Understanding and predicting forest change is critically important to the development of sustainable management strategies that will help preserve our precious forest resources for future generations. In this study, we will examine forest change by determining how, and to what extent softwood (evergreen) tree species such as fir and spruce germinate and grow beneath an established hardwood (aspen) forest. This is an important issue to address, since the timber industry utilizes both softwoods and hardwoods. In addition, the well-being of our native wildlife is dependent on diverse habitats that include both hardwood and softwood trees. Our study will address four key questions: 1. How important is distance to parent trees (seed source) in determining the recruitment rate of softwoods into hardwood forests? 2. Does softwood recruitment occur continuously, occasionally or rarely? 3. What environmental factors are most important in determining the establishment of spruce and fir into hardwood forests? 4. What environmental factors determine the growth of established spruce and fir seedlings? The study will take place at the north end of Childs Lake in the Duck Mountains. A minimum of 1,000 spruce and fir trees will be measured in the study.

WHERE IS THE RESEARCH BEING DONE?
Manitoba

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Norm Kenkel

Researchers

116. Socio-Economic Assessments Of Intensive Forest Management.

Project luckertmsoci6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

The key research question addressed in this project is, "what are the socio-economic implications of alternative IFM practices?" In pursuit of this research question, the objectives of this project are to: 1) Identify criteria for assessing IFM; 2) Evaluate alternative IFM practices at the stand level; and 3) Evaluate alternative IFM practices at the landscape level. Alternative IFM practices will be assessed, relative to non-intensive practices, according to a number of identified measurable criteria. Criteria will be adopted for investigating impacts at the stand and landscape levels. Landscape level assessments will include constructing alternative policy scenarios that vary: 1. Sustained yield cut controls; 2. AAC calculations based on one or more species; 3. Harvesting rights held by one or more tenure holders; and 4. Landscapes organized based on TRIAD concepts.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Martin Luckert

Researchers

115. Spatial And Non-Spatial Modeling Of Canopy Tree Dynamics In Boreal Forests.

Project lieffersvspat6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

In boreal forests, a variety of stand structures are possible, depending on the type and intensity of disturbance. After logging, future stand structure depends, to a great degree, on the silvicultural practices applied. Until recently, foresters strove for simple stand structures after logging, with an emphasis on even-aged, single species stands. While this traditional style of management is still common, management systems based on natural disturbance dynamics are also used, resulting in more complex stand structures. Global demands require boreal forest management to demonstrate sustainability. There is a clear need to compare and contrast alternative management strategies in terms of the structure, composition and timber yield that each strategy will produce in the future. Both stand and landscape level models are necessary to achieve long-term evaluations of the management strategies. In this project, we address three issues in stand level model development that require urgent attention: 1. Improving our prediction of growth and mortality of mature canopy trees; 2. Exploring mechanisms to link spatial and non-spatial models and improve their predictions; and 3. Exploring ways to scale up information from stand level to landscape level models. We believe that tactical spatially based forest plans, at the landscape scale, are a necessary step to demonstrating sustainable forest management. Such efforts will rely heavily on detailed stand level modelling of management strategies. We will improve the predictive abilities of the process-based spatially explicit succession model SORTIE and the non-spatial and empirical MGM growth and yield model for boreal forest conditions of British Columbia, Alberta, Manitoba and Quebec. We will determine ways to link these predictions to landscape scale models.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Victor Lieffers

Researchers
K. David Coates, *Gitte Grover*, *Norm Kenkel*, *Christian Messier*, *Stephen Titus*

114. Spatial And Temporal Patterns Of Natural And Human-Caused Forest Disturbance On The J.D. Irving Ltd. Black Brook District: Past, Present And Future.

Project macleandspat6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

The 190,000-hectare J.D. Irving Ltd. Black Brook District in New Brunswick represents some of the most intensively managed forest lands in Canada. In this study, we will use Black Brook as a case study to develop tools to manage for biodiversity and timber management, based on a coarse?filter approach. We will use the natural distribution of vegetation types by ecodistrict to set objectives for minimum areas to be maintained, and natural disturbance regimes for each vegetation community (disturbance agent, cycle length, and resulting stand and forest characteristics) to define guidelines for stand- and forest-level treatments consistent with natural stand structures and disturbance regimes. Methods and scenario planning tools will be developed to quantitatively analyze forest landscape patterns under managed and natural disturbance conditions. We will develop procedures to: 1) Characterize natural disturbance regimes for each vegetation community; 2) Establish the state and structure of vegetation patterns before active management of the forest began; 5) Use modelling to project the current and simulated potential forests under alternative scenarios; 6) Analyze management and disturbance effects on species composition, patch size, and age class distributions and within?stand structures; and 7) Compare temporal and size distributions of past and future harvesting and silviculture (based on management plan) with those potentially created by natural disturbances. Actual and projected landscapes will be assessed for the risk of extirpation of each vertebrate species, using a species sorting algorithm and spatially explicit landscape data. The New Brunswick land base will be used as a case study to develop tools and procedures that can be applied broadly to sustainable forest management in Canada.

WHERE IS THE RESEARCH BEING DONE?
New Brunswick

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
David MacLean

Researchers
Ian Methven, *Kevin Porter*, *Bob Wagner*

113. Sustainable Forest Management Through Co-Management In North-Western Ontario.

Project kantssust6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

The federal government has recognized the active role of Aboriginal people in Sustainable Forest Management (SFM) in the National Forest Strategy and in the Canadian Council of Forest Ministers (CCFM) Criteria and Indicators (C&I) of SFM. In recent years, many decisions in the Canadian courts have directed the provinces to recognize and protect Aboriginal and treaty rights in their resource development and planning. In the light of these developments, the challenge is to design institutions for co-management of forests with Aboriginal groups. To address this challenge, this project will: 1. Measure and compare the importance of economic, cultural, ecological, and other forest values to different stakeholders (the Aboriginal groups, other local groups, forest industries, and environmental non-government organizations); 2. Document the institutions of forest management used by different groups; and 3. Examine the relationships between the values and institutions of different stakeholders and elements of SFM, and with the criteria and indicators of SFM. Based on these outcomes, a general framework to design co-management institutions for SFM will be developed. The focus of this project is on Treaty #3, Treaty #9, and the Robinson-Superior Treaty areas in the boreal west region of Ontario.

WHERE IS THE RESEARCH BEING DONE?
Ontario

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Shashi Kant

Researchers
David Balsillie, *Katharine Rankin*

112. Terrestrial Vertebrates As Components Of A Boreal Forest Biodiversity Index.

Project boutinsterr6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

The ultimate objective of this research is to develop an "index of boreal forest biodiversity" that can be used by forest companies, certification organizations, government and the public to assess performance. An Index of Boreal Forest Biodiversity should be composed of a wide variety of criteria. Species diversity of a variety of taxa will certainly be one criterion. Terrestrial vertebrates have a number of characteristics that would make them potential candidates for consideration. Our goal in this project is to determine the feasibility of using terrestrial vertebrates as part of an index. To do this, we will: 1. Develop a cost-effective and reliable means of monitoring terrestrial vertebrates. We will investigate two approaches - winter surveys and fur trapping statistics; 2. Determine the relationship between human activities (size of human footprint, forestry activity, degree of habitat loss) and changes in terrestrial vertebrate distribution, abundance and predator-prey dynamics (i.e., are predator-prey cycles intact); 3. Given the relationship found in (2), we will attempt to develop a multimetric index of Biodiversity. The index can be viewed as a composite of terrestrial vertebrate diversity, distribution, and abundance that is strongly related to the degree to which the boreal forest ecosystem has been changed by human activities; and 4. Finally, we wish to establish a performance benchmark within which the biodiversity index can be placed to indicate the level to which biodiversity and ecosystem function have been retained.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Stan Boutin

Researchers

111. The Effect Of Fragmentation Size And Habitat Heterogeneity On Plant Diversity: A Multiscale Study In The Subhumid Low Boreal Forest.

Project gignaclthee6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

Habitat destruction results in habitat fragmentation that might influence local and regional patterns of biological diversity in several ways. However, despite the importance of plants in forest structure and function, their response to habitat fragmentation has been studied less than for animals. The purpose of this study is to attempt to determine the importance of the size and shape of fragments on trees, shrubs, herbs, lichens and mosses diversity in the remnants of the subhumid low boreal forest compared to habitat heterogeneity. We predict patterns of different scales for individual species and certain groups of species of taxa. This project will investigate the following questions: 1. What are the floristic composition and species richness of trees, herbs, shrubs, lichens and bryophytes in woodlots of different sizes and shapes? 2. How does species diversity vary along an edge-to-interior gradient in each fragment? 3. Does taxa richness vary across woodlot sizes and shapes at a landscape level? 4. Do woodlots of the same area have more in common floristically than those of differing size? 5. Are there any significant effects of woodlot sizes and/or shapes on taxa composition, richness and diversity? 6. Is the number of habitats a better predictor of changes in species richness and composition than area itself? 7. How area and number of habitats are related? 8. How different taxa respond to the scales of environmental variability? These questions will be addressed in terms of their implications for the management of private woodlots and biological conservation in forests embedded in an agricultural or other production-based landscape and in unfragmented forests.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
L. Dennis Gignac

Researchers
Mark Dale, *Cristina Mourelle*

110. The Importance Of The Littoral Biofilm On Methylmercury Accumulation In Relation To DOC Fluxes.

Project planasdthei6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

This project will contribute to the understanding of the influence exerted by harvesting in altering methylmercury accumulation in fish. More precisely, the study will verify the importance of littoral biofilms on methylmercury accumulation, and its transfer to fish, via benthos. This

project is complementary to Richard Carignan's project on water quality and mercury accumulation in fish and zooplankton. It will also verify the relationship between buffer strip width and methylmercury accumulation on littoral biofilms in streams. Our hypotheses are that littoral biofilms (mixture of algae, bacteria, fungus and detritus) constitute a reduced micro-environment favorable to mercury methylation, and hence to methylmercury accumulation. These biofilms are at the base of food chain and may prove to be an significant source of mercury to fish. Our rationale for these hypotheses is that: 1) Surface or subsurface runoff entering the littoral zone is less diluted than in the pelagic water column; 2) The efficiency in retention and recycling of chemicals is much greater among closely aggregated attached biofilm communities than in the pelagic; 3) The littoral has a greater availability of organic substrate for bacterial growth; and 4) Littoral sediments have a higher temperature than deep sediments. These littoral characteristics determine a higher exposure of littoral biofilm organisms to chemicals exported from the watershed, including both nutrients (dissolved organic carbon) or contaminants such as mercury. If biofilms produce methylmercury, it could be an important path of trophic transfer to fish since this community, which is at the base of the littoral food web, is the main feeding habitat for many invertebrates and fish.

WHERE IS THE RESEARCH BEING DONE?
Quebec

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Dolors Planas

Researchers

109. The Management Of Boreal Riparian Areas: Development Of Base-Line Data; Regionalization Of Parameters And Integrated Watershed Management Protocols.

Project bayleysthem6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

This project will develop a wetland protocol that is grounded in an inventory based ecosite classification system. Protocol development will allow industry to assess the impact that future disturbance will have on an individual wetland or wetland complex and the ability that wetland may have to buffer downstream impacts based on its ecosite type, size, and landscape position. Our goal will be achieved through the realization of several linked objectives: 1. Inventory of wetlands within the FMA utilizing existing spatial forest inventory provided by Louisiana Pacific will be conducted; 2. A field survey of 100 representative natural wetlands will be conducted and include plant identification, physical and spatial setting, and soil type. In addition, water samples will be collected for analyses of chemical parameters and concentrations (e.g., pH, conductivity, Ca, Mg, K, Na, nitrate, nitrite, ammonium, total phosphorus, total dissolved phosphorous, and soluble reactive phosphorus); 3. A wetland ecosite classification system will be established using cluster analysis; 4. Additional spatial data will be generated by linking with other digital layers available at Louisiana Pacific and an ecosite model will be developed; 5. The wetland ecosite model will forecast impacts and rank buffering capacity of wetland ecosite types; 6. Using the disturbance evaluation and the wetland ecosite model, we will develop our wetland management protocol system; and 7. Finally, in conjunction with other researchers, an overall Integrated Resource Management plan will be developed.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Dale Vitt, **Suzanne Bayley**

Researchers

108. The Role Of Renewable Resource Councils In Community-Based Forest Management Planning In The Yukon: The Case Of The Alsek Renewable Resource Council.

Project krogmannther6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

This project will examine the priorities and needs of the Yukon Renewable Resources Council (RRC) for having effective cooperation with other levels of government in sustainable forest management planning, in a region characterized by a comprehensive land claims settlement. This project has the practical import of informing other Yukon RRCs and communities about their options for forest planning and co-management. We will examine the organizational challenges for local RRCs, already in place through land claims settlements, to have a meaningful role in influencing forest policy and its implementation before timber harvest activity is significant. This project builds upon previous research on cooperative forest management in Alberta and Saskatchewan. Direct comparisons and contrasts will be made between the challenges for First Nations in N. Alberta and N. Saskatchewan to play an effective role in forest management and the Champagne Aishihik First Nations in SW Yukon. By examining governmental responsibility for forest management in the Yukon, the current role of RRCs in the Yukon, and interviewing key players involved in forest management, we will determine: 1) the preferred delegation of responsibility between the Yukon Renewable Resource Councils and the Federal and Yukon governments, as perceived by the different governments and Alsek RRC; 2) the organizational implications of forest co-management decisions when alternative forest management institutions (RRCs) are supported by land claim agreements; 3) the perceived needs and priorities of RRCs, in preparation for increased requests for timber harvesting and other land use activities within the First Nation traditional territories in the Yukon; 4) and the organizational, human resource, and ecosystem priorities of the Alsek RRC to function effectively in forest management planning.

WHERE IS THE RESEARCH BEING DONE?
Yukon

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Naomi Krogman

Researchers
Debra Davidson

107. Understanding Forest Users' Sense Of Place: Implications For Forest Management.

Project beckleytunde6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

This research will serve to better understand forest users' social-psychological orientations toward forested landscapes. Such an understanding has the potential to improve forest management if we are able to discover particular forest or landscape attributes and the experiences that users have with the landscape that are critical in the formation and maintenance of varying forest users' meanings and attachments associated with given locales. This work will build upon previous work among the research team on social values, but it will do so on a finer scale. That is, we will look at the activities, sites, site attributes, and experiences that are crucial to the formation of forest values for any given individual. We will also look at similarities and differences in sense of place within and across groups of forest users (recreationists, landowners, forest industry workers, First Nation members, and the like). We will provide much greater clarity regarding just what factors are responsible for forest users being strongly attached to given locales. The information we generate will help forest managers develop planning strategies and public involvement strategies by identifying issues and attributes of forests with which people are most concerned.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Tom Beckley

Researchers
Peter Boxall, *Bonita McFarlane*, *Richard Stedman*

106. Validation Of Wildlife Habitat Models Of The Biodiversity Assessment Project - Alberta.

Project duinkerpvali6

Start Date: April 1, 2000

WHAT RESEARCH IS BEING DONE?

The Biodiversity Assessment Project (BAP) has been researching and developing a suite of quantitative models for predicting possible biodiversity-related impacts of a range of alternative forest-management strategies since its inception in 1995. In BAP, biodiversity is characterized and measured in terms of ecosystems, landscapes, and species-specific habitats. So far, BAP has concentrated on model building, testing and first applications in forest-management planning. It is now imperative to strengthen the empirical basis for the models through field-oriented validation. The main objective of this project is to reduce key uncertainties in selected vertebrate-species habitat-supply models (HSMs) through targeted field-data collection on specific habitat characteristics and degrees of animal use of the habitats. Thus, we will deliver empirically strengthened HSMs for further use in forest-management planning. We will also provide further advice to MWFP regarding adjustments to the planned forest-management strategy to mitigate unwanted impacts on the species whose habitat is modelled by the four HSMs. For each of the HSMs chosen for validation work, we will 1. Undertake sensitivity analysis on the respective HSM to help determine what is most important to measure in the field; 2. Design the data collection protocols, collect and analyze the data; 3. Replace hypothesized model relationships with improved forms based on the field data; and 4. Provide new forecasts and advice to Millar Western Forest Products Ltd.

WHERE IS THE RESEARCH BEING DONE?

Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Peter Duinker

Researchers

105. Integrating Indigenous Values Into Forest Management Plans.

Project findlaycinte5

Start Date: July 1, 1999

WHAT RESEARCH IS BEING DONE?

The forestry sector is concerned about the impacts on other forest values when indigenous values are incorporated into forest management plans (FMPs). Specifically, if existing FMPs are modified to enhance the likelihood of achieving indigenous performance criteria, what is the effect on non-indigenous performance criteria? We will answer this question by establishing a case study area in Northern Alberta for which an FMP already exists. We will then: 1. Estimate the risks of not achieving the selected non-indigenous performance objectives of biodiversity conservation and contribution to the local and regional economies; 2. Enumerate a set of (local) indigenous values and associated goals, indicators and performance objectives, using community surveys administered through community representatives; 3. Estimate the risks of non-achievement of indigenous performance objectives under the current FMP; and 4. Model the change in the estimated risk to both indigenous and non-indigenous performance objectives as parameters of the FMP are changed. The result of these analyses will be a matrix that shows at a glance how management for certain performance objectives affects the likelihood of achieving other objectives. This matrix will provide a valuable tool for inclusive forest management and the development of sustainable forest management policy at local, regional and national scales.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Christopher Findlay

Researchers
Cliff Hickey

104. The Virginia Hills Fire: A Once-In-A-Lifetime Opportunity To Evaluate The Impact Of Natural- Versus Forestry-Related Disturbance On Water Quality, Contaminants And Biodiversity In Surface Waters On The Boreal Plains Of Alberta.

Project prepasethev5

Start Date: May 11, 1999

WHAT RESEARCH IS BEING DONE?

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Ellie Prepas

Researchers

103. Geographic Information Systems And Remote Sensing For Sustainable Forest Management: Challenge And Innovation In The 21st Century (Workshop).

Project sanchez-azofeifaggeog5

Start Date: May 6, 1999

WHAT RESEARCH IS BEING DONE?

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Gerardo-Arturo Sanchez-Azofeifa

Researchers

102. The Dead Bole Dynamics In The Mixedwood Boreal Forest.

Project johnsonethed5

Start Date: May 6, 1999

WHAT RESEARCH IS BEING DONE?

WHERE IS THE RESEARCH BEING DONE?
Saskatchewan

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Ed Johnson

Researchers

101. An Integrated Forest Management Strategy.

Project hickeycanin5

Start Date: April 1, 1999

WHAT RESEARCH IS BEING DONE?

We have established a partnership with Millar Western Forest Products (MWFP) and the Alexis First Nation (AFN) in an effort to arrive at strategies for sustainability of the boreal forest. We have previously developed community-based expertise to plan, develop, and carry out land use research to ensure that land use information is available and continually applied to forest management planning. A strategy has been developed that establishes appropriate protocols for consultation and cooperation between the partners. This research project addresses four primary objectives: 1. The application of Aboriginal knowledge (temporal/spatial) in industrial forest management; 2. To provide a source of training and capacity-building at the community level to enable Aboriginal communities to participate equitably in forest management; 3. To provide an additional increment of Aboriginal, industrial and university cooperation to further indicate the

viability of partnerships in land use planning and socio-economic development; and 4. To establish a framework for First Nation-industry cooperation through continued monitoring and evaluation. Direct involvement of the AFN in all phases of forestry operations will allow for the integration of local knowledge and understanding of the boreal landscape into a new, adaptive management approach to forest stewardship. Our strategy to achieve this will be accomplished through curriculum development, professional forestry training, employment, and monitoring and evaluation. Our short-term goal is to provide a foundation in which incremental change can occur and implement a framework in which such change can be monitored and evaluated. To this end, personnel provided by the partners shall monitor all levels of interaction of the partnership and provide warnings of problems and provide remedies.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Cliff Hickey

Researchers
David Natcher

100. Analysis Of Particulate Matter Loading In Community Ambient Air.

Project kindzierskiwanal5

Start Date: April 1, 1999

WHAT RESEARCH IS BEING DONE?

Inhalable particulates in ambient air can be affected by a number of sources. The research hypothesis being tested in this project is that emissions from beehive waste wood burning do not have an incremental contribution to concentrations of inhalable particulates communities. The study will: 1) Characterize the importance of different sources contributing to inhalable particulates in ambient air 2) Characterize the contribution of beehive wood waste burning emissions. The long-term objective of the research is to develop a better base of information for assessing incremental contributions of industrial and non-industrial emissions to ambient inhalable-particulate levels in communities. We will use tracer analysis on air samples collected in the community to characterize elemental composition of particulates and to infer source origins based on relative abundance of different elements. We will use trajectory analysis, involving monitoring of air particulate mass and wind speed and direction, to infer source origins based upon locations of air masses affecting the monitor.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Warren Kindzierski

Researchers

99. Biotechnology For Detoxication Of Pulp And Paper Mill Effluents.

Project mohnwbiot5

Start Date: April 1, 1999

WHAT RESEARCH IS BEING DONE?

Toxicity removal in pulp mill effluent treatment systems sometimes fails due to stresses on the microflora resulting from shutdown, extreme temperature, or loading shock. The main objectives of this research are to develop inocula capable of stimulating the recovery of toxicity removal in those systems and to better understand the microbial ecology and biochemistry of resin acid removal in such treatment systems. Organisms with potential as inocula will be isolated, characterized, and tested for efficacy by adding them to complex microbial communities growing on pulp mill effluent in laboratory cultures. Further tests of promising strains will be conducted in laboratory bioreactors and pilot-scale systems, using molecular probes to quantify their population and metabolic dynamics. These studies will not only test efficacy of the inocula, but will also provide basic ecological and kinetic information about these microbial systems. The research will also clarify the metabolic pathway for the degradation of abietane resin acids by Pseudomonas abietaniphila BKME-9. The main hypothesis being tested is that we can understand and rationally manipulate microbial populations in biological treatment systems.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
William Mohn

Researchers

98. Defining Bird Indicators To Silviculture At The Scale For Forest Management Units: A Cross-Canada Analysis.

Project drapeaupdefi5

Start Date: April 1, 1999

WHAT RESEARCH IS BEING DONE?

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Pierre Drapeau

Researchers

97. Evaluation Of The "Echo" System And Scenario Planning For Sustainable Forest Management.

Project kesslerweval5

Start Date: April 1, 1999

WHAT RESEARCH IS BEING DONE?

There is widespread agreement within the scientific community about the technical and process requirements for sustainable ecosystem management and planning. However, still needed are: 1) processes for defining sustainable goals and objectives; 2) spatially explicit models capable of forecasting resource conditions, values, and inter-relationships at multiple scales; 3) tools and processes to display, interpret, and analyze possible future conditions and resource trade-offs; and 4) more meaningful participation of people in the formulation, interpretation, and selection of

forest management scenarios. We believe that the "Echo" suite of models for decision support and scenario planning can address these needs. To test this hypothesis, we will apply these tools and processes in an actual forest management context and evaluate their performance with respect to technical and social objectives of sustainable forest management. Researchers will first evaluate the accuracy and performance of the Echo suite of models for assessing resource states, stocks, flows and interactions. They will then apply the Echo to integrate the values, uses and traditional knowledge of the Tl'azt'en Nation into scenario planning for the Tl'azt'en/UNBC Research Forest. Finally, the team will evaluate the effectiveness of Echo-assisted scenario planning for achieving the meaningful participation of the Tl'azt'en in sustainable forest management planning.

WHERE IS THE RESEARCH BEING DONE?
British Columbia

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Winifred Kessler

Researchers
Annie Booth, *Stephen Dewhurst*, *Gail Fondahl*

96. Fouling Mechanisms And Control Strategies For Improving Membrane Filtration In Pulp And Paper Mill Effluent Treatment.

Project zhouhfoul5

Start Date: April 1, 1999

WHAT RESEARCH IS BEING DONE?

Membrane technology offers many advantages over conventional treatment processes, including: 1) Effectiveness in removing both colloidal and dissolved contaminants; 2) Production of high quality permeate that could be used for water recycling and reuse; 3) Compact installation; 4) Reduced chemical requirements; 5) Little restriction to toxic compounds; 6) The ability to operate at high temperatures. As membrane manufacturing technologies advance, membrane filtration will become more attractive and economically competitive with other conventional processes. The critical obstacle hindering widespread application of membrane technology is membrane fouling, which results from the attachment, accumulation, or adsorption of substances onto the membrane surface or within the membrane pore. This places a substantial economic restriction on operation because excessive fouling requires frequent backwash and even membrane replacement to compensate for a rapid decline in product water flux. This research will improve the current level of understanding of the basic mechanisms of membrane fouling during wastewater treatment, and provide the pulp and paper industry with effective methods for fouling control strategies under a variety of real-world scenarios.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Hongde Zhou

Researchers
Daniel Smith

95. Health Issues In Northern Aboriginal Forest Dependant Communities.

Project gibsonnheal5

Start Date: April 1, 1999

WHAT RESEARCH IS BEING DONE?

New forest management strategies have implications for the health of local residents, either through changes in exposure to disease, or through changing socio-economic conditions in forest dependent communities. One component of this project will be to develop a model of emerging infectious disease associated with ecological disturbance using a case study that examines the relationship between patterns of ecological change, deer mouse populations, and the risk of exposure to hantavirus. A second component of this research addresses socio-economic conditions in forest dependent communities. Researchers will build a collaborative research strategy with the Métis Nation of Alberta in order to identify health priorities in an Aboriginal community near Hinton. Researchers will use methods that identify the socio-cultural relevance of employment in the forest industry and the production of non-timber forest products in an economy that relies heavily on forest use.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Nancy Gibson, **Tee Guidotti**

Researchers

94. Impact Of Slash Loading And Residual Trees On Soil Temperatures And Aspen Regeneration.

Project vanreeskimpa5

Start Date: April 1, 1999

WHAT RESEARCH IS BEING DONE?

Louisiana-Pacific Canada Ltd. harvests aspen in Manitoba year round. After harvest, the slash (branches and leaves) is left scattered in the cutblock. Some cutblocks will also contain standing trees that have not been harvested. These slash piles and standing trees are a concern in that they may reduce the ability of aspen to regenerate naturally by reducing soil temperatures. To help us understand the effect of these forest practices, our study will have three parts: 1. At what depth do aspen roots sucker and is this depth influenced by slash loadings? Aspen roots will be excavated to determine the depth and location of suckering after winter or summer harvest, and different slash loadings. 2. What are the soil temperature regimes for soils beneath slash loadings and how do they relate to aspen suckering? Soil temperatures will be measured continuously underneath various slash loadings to determine average, maximum and minimum temperatures and how they relate to aspen suckering. 3. What is the critical temperature regime for aspen suckering? We will use growth chamber experiments to determine how diurnal temperature fluctuations affect aspen suckering.

WHERE IS THE RESEARCH BEING DONE?
Manitoba

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Ken Van Rees

Researchers

93. Impacts Of Natural Disturbance And Forest Harvesting On Water Quality Of Lakes And Streams Of The Boreal Sub-Arctic, Highlands And Wetland Mixed Wood Ecoregions Of Northern Alberta.

Project prepaseimpa5

Start Date: April 1, 1999

WHAT RESEARCH IS BEING DONE?

Members of the Little Red River / Tall Cree Nation (LRR/TC) have traditional knowledge and values associated with water quality and the landscape that differ from those normally included in resource-based management models. We believe that this knowledge and these values represent an underutilized resource for managing watershed ecosystems. In this project, we will work with tribal elders on their land (through trapping) to learn landscape features important to their lifestyle, and document the traditional knowledge and ecological values of the LRR/TC in relation to water quality and landscape management. We hope that what we learn about the implications of quality for First Nations use of land-water resources will inform future scientific recommendations. This project includes a field program identifying the impacts of watershed disturbances (fire and forest harvesting) on water quality in lakes and streams within traditional lands of the LRR/TC. Two years of data have been collected examining the impact of forest fire on 34 lakes distributed between burned and unburned watersheds on the Caribou Plateau. The modeling component of this study relates surface water chemistry to spatial patterns of vegetation in a watershed and is focused on six streams and two rivers north of High Level, Alberta. The two rivers form the primary drinking waters of the community of John D' Or Prairie. We know disturbance alters biogeochemical processes in watersheds with potential increases in the transport of nutrients and heavy metals to surface waters. The potential for impact on human health and eutrophication of surface waters are of concern to the First Nations people, whose livelihood depends on the quality of water in these streams and lakes.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Ellie Prepas

Researchers

92. Optimization-Based Forest Planning Tools For Sustainable Forest Management.

Project hauergopti5

Start Date: April 1, 1999

WHAT RESEARCH IS BEING DONE?

There is new interest in optimization approaches to forest management scheduling problems among Canadian forest management planners, as they come to realize that there are disadvantages to simulation models. When using simulation models, the analyst does not know

how close the latest simulation run is to the best solution. Many forest management planners and analysts abandoned optimization approaches based on linear programming that had been developed in the 1970s and 1980s, because they were incapable of handling the required spatial detail. We are developing a set of forest planning tools that combine the advantages of simulation models with optimization approaches. These are based on a decomposition approach to solving large-scale mathematical programming problems. The approach is similar to simulation methods, in that a large amount of spatial detail will be retained in the model formulation, but it yields solutions that are optimal for practical purposes. We plan to apply this optimization approach to a number of important forest management problems. We will apply the approach to the analysis of the cost of regulatory constraints, by investigating the costs of implied constraints due to overlapping tenure on the Weyerhaeuser Canada Ltd. and Alberta-Pacific Forest Industries Inc. forest management areas. We will then develop: 1) An approach for incorporating probabilistic stand transition/succession into the modeling framework; 2) A framework for linking or tying detailed tactical forest planning at township level to strategic forest level plans; and 3) An extension of the decomposition optimization approach to include spatial relationships found in wildlife habitat models.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Grant Hauer

Researchers
Jim Beck, *Fiona Schmiegelow*

91. Quantifying Landscape Pattern And Fragmentation: A Transect Analysis Approach In Alberta.

Project sanchez-azofeifagquan5

Start Date: April 1, 1999

WHAT RESEARCH IS BEING DONE?

This project recognizes that biodiversity losses take place at multiple levels (landscape, ecosystem, species, genes), spatial scales (local to regional), and dimensions (biophysical drives, proximal causes and social/human drives). Geographic Information Systems (GIS) and remote sensing are being used to answer the following questions: 1. What is the relationship between different levels of agricultural, forestry and gas/oil extraction and biodiversity losses in boreal landscapes? 2. How accurately can patterns of biodiversity in intervened habitats be predicted on the basis of geographic and remote sensing information, and 3. How can GIS and remote sensing help to design practical measures in the area of ecosystem restoration, therefore enhancing the capacity of countryside habitats to sustain biodiversity and ecosystem services, as well as human activities? These questions are being studied by means of a northeast/southwest transect land characterization analysis in Alberta. Current available digital data sets are being compared with information from remote sensing. The main goal is to try to understand the role that different landscape structures and sources of information play on species abundance.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Gerardo-Arturo Sanchez-Azofeifa

Researchers
Susan Hannon

90. Quantifying Long Term Changes In Organic Matter Sequestration For Carbon Management: Permafrost Dynamics And Climate Change.

Project vittdquan5

Start Date: April 1, 1999

WHAT RESEARCH IS BEING DONE?

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Dale Vitt

Researchers

89. Reactor Design For Enzyme Catalyzed Colour Removal From Pulp Mill Effluent.

Project buchananireac5

Start Date: April 1, 1999

WHAT RESEARCH IS BEING DONE?

Peroxidase enzymes isolated from their parent organisms have been shown to remove aromatic compounds from industrial effluents. In particular, horseradish peroxidase (HRP) has demonstrated a good ability to catalyze colour removal from pulp mill effluents. HRP has also been shown to catalyze the precipitation of phenols and the dechlorination of chlorinated phenols. Implementation of this technology to treat industrial wastewaters has been hampered by the instability of these enzymes, their cost, and problems with retaining active enzymes in the reactor. However, immobilization of the enzymes on solid media (gel beads, cellulose, and other media) improves its stability and extends its useful life. Experimental work will use batch reactors to obtain kinetic data, investigate the relationship between colour removal and hydrogen peroxide consumption, and identify the best point within the pulping process to apply the enzyme catalyze colour removal process. The goal of this research is to develop a process model which can be used in reactor design, and as a tool to gain a better understanding of the enzyme-catalyzed colour removal process.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Ian Buchanan

Researchers
Daniel Smith

88. Spatially-Explicit Calibration Of A Light Model For Eastern And Western Boreal Forests.

Project lieffersvspat5

Start Date: April 1, 1999

WHAT RESEARCH IS BEING DONE?

We have been developing a spatially explicit light model (MIXLIGHT) to predict light in the understory of boreal forests. This model will be an integral part of the efforts of researchers calibrating the SORTIE model, which predicts development of mixed species stands. The MIXLIGHT model has been calibrated and tested successfully for prediction of average light conditions above the shrub layer in Alberta mixedwood forests. In this project, we will: 1) Modeling the influence of shrubs and herbs on light extinction, using existing data collected from Alberta and Québec. 2) Developing a new technique for estimation of leaf area density and leaf angle inclination using mapped stands in Alberta and Québec. This technique might also be applied to estimation of absorption of red and far-red light by individual species. 3) Testing the spatially explicit accuracy of light predictions of the model from mapped stands in Alberta and Québec. Once the MIXLIGHT model is calibrated and tested, it will be inserted into the SORTIE model being developed for boreal forests.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Victor Lieffers

Researchers
Christian Messier

87. Caribou Mountains Critical Wildlife/Habitat And Traditional Ecological Knowledge Study.

Project freemanmcari4

Start Date: January 13, 1999

WHAT RESEARCH IS BEING DONE?

The southeastern escarpment of the Caribou Mountains, northern Alberta, is currently slated for oil or gas exploration (1999), mineral exploration (1998) and logging (2001). This virtually undisturbed area appears to contain critical habitat for local populations of caribou, moose and bison, each of which is of particular importance to the aboriginal occupants of the region, the Little Red River / Tall Cree Nation (LRR/TC). Critical habitat for these species, and seasonal patterns of habitat use, however, are undocumented. The traditional ecological knowledge of LRR/TC elders will play a key role in documenting local distributions, movements and critical habitats of these species prior to disturbance. At the same time, traditional ecological knowledge relevant to assessing the impacts of fire and other natural disturbances on these species will be documented. Although environmental monitoring by Aboriginal Peoples is not a part of this project, their observations will assist in determining individual and cumulative impacts of planned industrial activities during and after disturbance. Finally, to provide a comparative framework for this research, we will conduct literature reviews of traditional ecological knowledge in boreal regions relevant to these three species, and the impact of natural and human disturbances on their patterns of movements and behaviors. We will work with the LRR/TC to develop a methodology to document and represent their traditional ecological knowledge in a

culturally appropriate manner. The combination of traditional ecological knowledge and scientific knowledge will also be used practically to inform decisions taken by the Caribou Mountains/Lower Peace Cooperative Planning Board.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Naomi Krogman, **Milton Freeman**

Researchers

86. Colour Removal From Pulp Mill Efluents Using Immobolized Horseradish Peroxidase.

Project buchananicolo4

Start Date: November 27, 1998

WHAT RESEARCH IS BEING DONE?

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Ian Buchanan

Researchers
James Nicell

85. Maximizing Enhanced Ozone Oxidation Of Pulp Mill Effluents.

Project smithdmaxi4

Start Date: November 27, 1998

WHAT RESEARCH IS BEING DONE?

This project deals with the reduction of colour and of halogenated organics in pulp mill effluents treated by ozonation in an activated sludge basin. The project includes the design and development of a jet-bubble ozone contactor that uses opposing venturi injectors for mixing, and the application of the findings to pulp mill effluent treatment. The ozonation process may not only be affected by the hydrodynamics of the ozone contactor, the efficiency of the gas-liquid mass transfer, and the chemical reactivity of raw water, but also by rapid ozone reaction kinetics occurring before complete mass transfer. Intersecting venturi injectors will be used to increase the turbulence and the apparent gas-liquid mass transfer; this result will be reflected in the overall mass transfer coefficent (kLa). Enhanced mass transfer may reduce the cost and improve the performance of ozonation treatment of pulp mill effluents.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Daniel Smith

Researchers

84. The Effectiveness And Potential Of The Caribou-Lower Peace Cooperative Forest Management Board.

Project krogmannthee4

Start Date: June 26, 1998

WHAT RESEARCH IS BEING DONE?

The purpose of this research is to document the process and challenges associated with setting up a cooperative forest management Planning Board with representatives of First Nations, Government, and Industry. Therefore, an initial goal of this research has been to serve as observers while the LRRTC First Nations and the Government of Alberta negotiate a Memorandum of Understanding (MOU). This is a critical stage in the process of creating an alternative institution to promote sustainable forest management in the Caribou-Lower Peace region. Once the Caribou-Lower Peace Cooperative Forest Management Board is established, researchers will monitor its progress. Specifically, they will examine whether the Board's structure, process and content can facilitate effective Cooperative Forest Management.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Naomi Krogman

Researchers
Leslie Treseder

83. Utilization Of Pulp Sludge Waste Fibre For Capillary Wicking And Barrier Layers In Landfills.

Project zeisscutil4

Start Date: April 27, 1998

WHAT RESEARCH IS BEING DONE?

Wastewater treatment systems in pulp mills produce large volumes of waste pulp fibre in their primary clarifier sludge. In municipal and industrial landfills, high and consistent moisture content are required to achieve high rates of biodegradation. This research project will investigate the use of waste fibre as daily cover to enhance biodegradation in new and existing municipal and industrial waste landfills. The waste fibre acts as a wicking layer, aiding the recirculation of landfill leachate by capillary flow. The key questions to be examined include: 1) Can waste fibre be used as daily cover in landfills? 2) Can capillary flow provide a significant flow and redistribution of moisture within landfills? 3) Does pulp waste fibre provide a suitable attached growth medium for anaerobic degradation? 4) Can pulp waste fibre mats as daily cover and wick layers function for a long time? The design and development of daily cover as capillary wick leachate recirculation systems from waste fibre can eliminate landfill costs to pulp producers and possibly provide a value-added product at a competitive price (to the landfill owner) that will cover the transport, wick manufacture and installation costs. This approach will improve the resource utilization of the pulp fibre by converting a waste product into a valuable by-product.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Chris Zeiss

Researchers
Chunping Dai

82. Kinetics Of TRS Gas Removal And Filter Bed Degradation In A Biolfiltration Process.

Project branionrkine4

Start Date: April 8, 1998

WHAT RESEARCH IS BEING DONE?

This project will investigate what governs the amount of reduced sulfur gases that can be removed from air by biofiltration and the rate at which they can be removed. The research involves measuring the amount of sulfur gases removed and the rate at which they are removed, as well as determining the effects of start up, shut down, and idle periods, during which no gas is supplied to the biofilter, on subsequent removal levels. The rate of filter bed degradation is also being studied since, over time, the filter bed decays and at some point becomes impassible to air under reasonable pressure drop conditions. Goals of this project are to develop a method whereby biofilters can be designed from basic principles so that one could calculate how big a biofilter would have to be to remove a certain amount of sulfur containing gas from a known air flow with a known level of pollutant content, and to be able to predict how long a biofilter could remain in service before plugging without being replaced.

WHERE IS THE RESEARCH BEING DONE?
British Columbia

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Richard Branion

Researchers

81. Pulp Mill Effluent Induced Coagulation And Flocculation In Receiving Waters.

Project smithdpulp4

Start Date: April 8, 1998

WHAT RESEARCH IS BEING DONE?

Pulp mill effluent discharge can result in floc formation and deposition of an organic matrix and suspended sediments in the river downstream of the mill. This pulp-mill-effluent-induced coagulation and flocculation may have an impact on the bottom dwellers of aquatic ecosystems by affecting dissolved oxygen, aquatic habitats, biodiversity and productivity. Factors affecting formation and degree of pulp-mill-effluent-induced coagulation and flocculation have been evaluated, and the mechanisms of its formation have been investigated in bench scale experiments and two field surveys. We will continue this research at pilot and full scales to

investigate the mechanisms of pulp-mill-effluent-induced coagulation and flocculation formation and develop a parameter that can account for its effect in transport models. Pilot-scale experiment will be conducted in an artificial long-length flume, and full-scale experiments will be conducted in different Alberta rivers that receive pulp mill effluents during different seasons. Numerical modeling will follow to develop parameters that can account for the effects of pulp-mill-effluent-induced coagulation and flocculation, deposition, and re-suspension in the transport models. We expect the results to aid effective long-term river management, and in the minimization of impacts on aquatic ecosystems.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Daniel Smith

Researchers

80. Determination Of Reference Points And Framing Analysis For Negotiations And Public Involvement In Environmental And Forest Management.

Project zeisscdete4

Start Date: April 1, 1998

WHAT RESEARCH IS BEING DONE?

The Canadian federal and provincial government has increasingly required that forest managers and environmental decision-makers seek public participation and consultation. In public involvement processes, different stakeholders (regulators, industry, residents and environmental interest groups) "frame" the decision scenario differently by the sets of facts, the reference points and values, the arguments they present in public and by the desired outcomes. The differences in these frames indicate sources of controversy; the common factors provide the basis for mutually acceptable solutions. In this project, we will: 1. Define and structure the variables that constitute a frame, including stakeholders' sets of facts, consequences of the decision, reference points and values, desired outcomes and presentation of their perspective 2. Elicit and determine stakeholder groups' frames (based on the variables defined above) and, in particular, their perspective of proposed actions as gains or losses in relation to their reference points. Identify common factors and differences among these frames 3. Develop and evaluate proposed environmental and forest management actions based on their capability to fit stakeholders' frames. Key research questions include: 1) What are the significant differences in stakeholder frames? 2) What do the stakeholders have in common? 3) Do certain stakeholders strategically reframe their position to influence other stakeholders and decision-makers? 4) How do others respond to these attempts? 5) What common ground can be achieved for mutually acceptable solutions?

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Chris Zeiss

Researchers
Vic Adamowicz, Naomi Krogman

79. Dynamics Of Arthropod Assemblages In Forests Managed To Emulate Natural Disturbance.

Project spencejdyna4

Start Date: April 1, 1998

WHAT RESEARCH IS BEING DONE?

Question: Is arthropod diversity related to the amount of coarse woody material in a stand? Results to date: So far, we've collected data to provide a provisional answer to this question before manipulation with respect to epigaeic and saproxylic species. However, most of this material remains to be sorted and identified. A better, more relevant answer will be available in the several years after harvest. Management Considerations: In the boreal forests of Fennscandia it appears that volume of coarse woody material strongly affects the number of saproxylic species that can be found in a stand. These species, which are critical to the first phases of nutrient cycling, become less diverse and rarer as volume of CWD decreases. Residual material left on a cutblock should help ensure retention of such species, but at present there is no guidance for answering the question "how much residual should be left?". If this relationship levels out at some level of CWD, for example, the maximum amount required will be clearly established. Deliverables: Specific recommendations about the volume of coarse woody material required to sustain the saproxylic assemblage at some specified level of diversity. Other Questions Under Consideration: 1. How comparable are the trajectories of representative arthropod assemblages during recovery from fire and harvest treatments imposed in the EMEND experiment? 2. What species consistently show measurable population responses to disturbance, so as to be valuable as possible "indicators" during extensive monitoring? 3. What are the important functional connections among insect, plant and fungal responses during understory development? 4. Are there important functional connections among nutrient cycling, arthropod activity and productivity during early succession?

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
John Spence

Researchers
Ralph Cartar, *David Langor*, *Mary Reid*, *W. Volney*

78. Fire Caused Mortality In Boreal Trees.

Project johnsonefire4

Start Date: April 1, 1998

WHAT RESEARCH IS BEING DONE?

In order to understand how fire damages and kills trees, we must know the physical mechanisms by which fire causes its effects must be studied. In surface fires, such as those used for management purposes, the effects of the fire are caused by heat transfer into the roots, bole, and crown from duff combustion, the flame, and the buoyant plume, respectively. The objective of this portion of this project is to produce and test models of heat transfer and tissue necrosis for Picea glauca (white spruce) and Populus tremuloides (aspen), the dominant species in the EMEND plots where the experimental burns will be conducted. Measurements of fire behavior and heat transfer will be made at the time of the burns and on individual trees. Ultimately, tree

mortality will be related to patterns of tissue necrosis.Given aspen's positive response to forestry activities and its reputed action as a fire break, the effect on fire behavior of fuels in aspen-dominated stands is an important research question. With both a physically-based understanding of tree mortality and information on the natural range of variability in fire behavior expected in boreal forest stands, predictions can be made for the relative importance of partial and complete stand-level tree mortality in boreal forest fires. The objective of this portion of this project is to determine the expected natural range of variability in fire behavior with physically-based surface and crown-fire-behavior models that incorporate fuel and long-term weather data. In these models, fuel data collected from boreal mixedwood stands will be used.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Ed Johnson

Researchers

77. Fish And Benthic Invertebrate Community Assessment In The Moose River Basin.

Project dixondfish4

Start Date: April 1, 1998

WHAT RESEARCH IS BEING DONE?

This project builds on previous SFM-NCE efforts to develop integrated tools for ecological monitoring of anthropogenic impacts in aquatic environments, particularly in river systems. Ecological monitoring is required in order to understand if the stressors associated with forestry activities and pulp and paper production have undue influence on aquatic resources. The study will characterize benthic macroinvertebrate and fish communities in the Moose River Basin of northern Ontario. This effort is designed to understand the natural habitat features (valley slope, latitude, longitude, basic water chemistry parameters, stream size, etc.) that influence the composition of both benthic and fish communities. Fisheries and benthic invertebrate data, as well as the physical, chemical and hydrological characteristics of the watershed, will be available on a wide variety of reference and potentially impacted sites. This will greatly increase our ability to judge the efficacy of biomonitoring for making scientifically sound and informed decisions about the environmental risk associated with forestry activity in large river systems.

WHERE IS THE RESEARCH BEING DONE?
Ontario

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
D.G. Dixon

Researchers

76. Forest Succession And Post-Logging Regeneration Dynamics In The Duck Mountain Ecoregion, West-Central Manitoba.

Project kenkelnfore4

Start Date: April 1, 1998

WHAT RESEARCH IS BEING DONE?

In this project, we are investigating forest stand dynamics and post-logging regeneration in the boreal forests of Duck Mountain in west-central Manitoba. Our objective is to develop sustainable forest management policies and procedures, and to determine differences and similarities between the effects of fire and of timber harvesting on forest stand structure, productivity and biological diversity. We will first investigate successional change of forest stand-types in the region, and identify the major biological and non-biological processes driving these changes. To do this, we will do detailed, intensive sampling of natural forest stands. Forest stand succession will be inferred by aging trees, and by examining changes in species composition between the canopy-subcanopy and regeneration layers (saplings and seedlings). Measuring such variables as soil type, slope, aspect and stand disturbance will help us understand the environmental factors involved. We will then sample post-logged stands and experimental plots to determine the effects of advanced regeneration (small trees, usually softwoods, that are left standing during logging) and slash loadings on regeneration and biodiversity in logged trembling aspen and balsam poplar stands. Using these two approaches, we will develop a model to predict the long-term recovery of timber-harvested stands, and to determine the conditions most favorable to maintaining biodiversity and productivity of merchantable stands. Our results will also be compared to related studies in Alberta, Saskatchewan, Ontario, Quebec and eastern Manitoba, in order to determine both the common and unique features of forest stand dynamics in our study region.

WHERE IS THE RESEARCH BEING DONE?
Manitoba

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Norm Kenkel

Researchers

75. Historical Disturbance Regime, FML #3, West Central Manitoba.

Project sauchyndhist4

Start Date: April 1, 1998

WHAT RESEARCH IS BEING DONE?

Our research objective is to reconstruct and map the historic disturbance regime of FML #3 and especially the forest fire history, in relation to the present forest mosaic. FML #3 is in the Duck Mountains of west central Manitoba. Proxy paleoenvironmental data, historical records and digital geographic data (e.g., forest inventory, soils, satellite imagery) will be combined to examine the relationship between human activities and the natural disturbance regime. An ecosite classification of the forest ecosystems will be derived from the digital geographic data, using the ARC/INFO GIS and EasiPace image analysis system. At the ecosite scale, forest boundaries and patterns reflect local environmental gradients and natural disturbance. In the relatively dry and open southern boreal forest, coniferous trees can survive multiple fires and store a fire history. The best evidence is locally-damaged cambial tissue. These fire scars correspond to specific tree rings and thus calendar years. A master chronology of regional tree ring width variation will be the basis for assigning calendar years to the rings of dead wood. It also is a proxy record of inter-annual climatic variability. Longer-term climatic and vegetation change will be established from the analysis of lake sediments. These tree-ring and paleoecological records will provide a historical perspective on the interactions among fire,

vegetation and climate.

WHERE IS THE RESEARCH BEING DONE?
Manitoba

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Dave Sauchyn

Researchers
Ian Campbell

74. Large Scale Issues In Sustainable Forest Management: Wildlife Habitat Modeling And Biomonitoring.

Project schmiegelowflarg4

Start Date: April 1, 1998

WHAT RESEARCH IS BEING DONE?

The primary objective of this project is to develop an integrated suite of models of natural forest dynamics and forest management that facilitate the evaluation of various management scenarios. Forest management plans designed to emulate the landscape patterns created by natural disturbance regimes represent a coarse-filter approach to biodiversity management. The underlying assumption is that by maintaining a range of stand ages and tree species compositions within the range of natural variability, suitable habitats and landscape structure, and hence biological diversity, will be conserved. Quantification of natural variability, and management planning, will largely be based on forest inventory information. However, the ability of forest inventory data to predict wildlife habitat quality is not known and specific associations from detailed, but geographically limited, ecological studies may not be representative of broader-scale patterns. There is also a need to understand how spatial aspects of habitat distribution, such as patch size, shape and juxtaposition, affect suitability, and how animals respond to the habitat mosaics created by forest harvesting. Furthermore, it is necessary to identify measurable parameters to check whether the biodiversity objectives encapsulated in a landscape management approach are in fact being realized. This project attempts to address some of these needs by making use of existing data, and employing novel statistical and modeling approaches, within the larger, integrated program of the Large-scale Issues of Sustainable Forest Management Group.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Fiona Schmiegelow

Researchers
Jim Beck

73. Maintaining Biodiversity In Post Disturbance Landscapes (Phase II).

Project diamondamain4

Start Date: April 1, 1998

WHAT RESEARCH IS BEING DONE?

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Antony Diamond

Researchers
Graham Forbes

72. Managing For Biodiversity At A Forest Level (Strategic Planning): A Case Study.

Project methvenimana4

Start Date: April 1, 1998

WHAT RESEARCH IS BEING DONE?

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Ian Methven

Researchers

71. Modeling Impacts Of Forest Management And Climate Change On Forest-Peatland-Lake Carbon Store And Fluxes.

Project campbellimode4

Start Date: April 1, 1998

WHAT RESEARCH IS BEING DONE?

The western boreal forest includes not only forested uplands, but also extensive peatlands and lakes. Together, forests, peatlands, and lakes form a complex system in which carbon is fixed, stored, exchanged, and released. While forest carbon budgets have been studied at a national scale, no carbon budget has been developed specifically for the western boreal region's forests, peatlands, or lakes. Furthermore, no model has been developed for the interactions of these subsystems anywhere. This research will develop a set of integrated models for carbon imports, storages, and exports within and between each of these subsystems. This will thus form the first integrated model of carbon budgets of the complete terrestrial ecosystem anywhere. The focus will be on decadal or longer timescales and large regional spatial units. The key questions to be answered by this work are: (1) what are the relative importances of carbon fluxes between these subsystems? (2) how are these fluxes affected by fire and other natural disturbances? (3) how can these fluxes be impacted by changing land use and forest management options? (4) how might these fluxes be impacted by future climate change? The eventual aim is to develop a Landscape Carbon Storage Decision Support System for forest managers.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Ian Campbell

Researchers
Mike Apps

70. Natural Regeneration Of White Spruce Following Natural Disturbance In The Western Boreal Forest.

Project macdonaldsnatu4

Start Date: April 1, 1998

WHAT RESEARCH IS BEING DONE?

The boreal mixedwood forest can be described as a shifting mosaic in which successional communities are constantly responding to varying frequency and intensity of disturbance, primarily fire. On mesic sites in the boreal mixedwood, white spruce typically establishes in mixed stands that are dominated by aspen. The transition from aspen-dominated to spruce-dominated stands develops over time as the aspen canopy matures and breaks up. Within this transition, there is considerable variation in both the timing and density of white spruce recruitment. In this project, we will look at the underlying causes of this heterogeneity by focusing on seed availability and the influence of the aspen canopy. We hope to document the timing and density of white spruce regeneration at the stand-to-landscape-scale as a function of: 1) Pre-disturbance vegetation composition; 2) Current overstory composition; 3) Co-occurrence of fires and mast seed years; 4) The presence of veteran white spruce trees. The data will be used directly for spatially explicit landscape- and stand-level models of forest succession. Simultaneously, we will begin a cooperative effort to develop and calibrate a model of establishment and early succession (SORTIE/boreal).

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
S. Ellen Macdonald

Researchers
Mark Dale

69. Patterns And Processes Of The Boreal Forest Understory: A Comparison Of Post-Fire And Post-Harvest Dynamics.

Project macdonaldspatt4

Start Date: April 1, 1998

WHAT RESEARCH IS BEING DONE?

The re-development of a plant community following disturbance is a complex and dynamic process. This study looks at the effects of disturbance intensity and type on the early establishment phase of plant succession, and at subsequent competitive interactions. We expect the effects of harvesting to differ from those of natural disturbances such as fire, but there are no studies specifically comparing the effects of these two types of disturbance in the boreal forest. The EMEND (Ecosystem Management Emulating Natural Disturbance) experiment provided us with a unique opportunity to develop a comprehensive understanding of forest succession for a variety of site types within the western boreal forest. We will compare the forest succession that follows natural disturbance (usually fire) to the succession that follows harvest-related disturbance. We will also specifically test the effectiveness of a series of partial-cut harvesting systems in emulating the processes of natural disturbance. We will examine the variables that drive succession following disturbance, including: 1) Disturbance intensity (through effects on residual canopy, germination sites and resource availability); 2) Interference and competition

between vascular and non-vascular plant communities; 3) Associated shifts in relative dominance by marsh reed grass vs. fireweed and their effects on the plant community; 4) Disruption of spatial pattern in the plant community; 5) Interactions with the invertebrate community. The results will provide an empirical data baseline with which to model the effects of various partial-cut harvesting systems on plant community composition, diversity, and dynamics as compared to the impact of disturbance by fire.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
S. Ellen Macdonald

Researchers
Mark Dale, *Victor Lieffers*, *Alison Munson*, *Dale Vitt*

68. Strategies And Institutions For Sustainable Forest Management, Cross-Linked With Understanding Natural Disturbance.

Project rempelrstra4

Start Date: April 1, 1998

WHAT RESEARCH IS BEING DONE?

The focus of this project is to develop planning tools for natural disturbance management, and to provide a spatial programming shell to assist researchers studying EMEND (ecological management emulating natural disturbance) in developing their own models as ArcView extensions. This year, the researchers will be focusing on knowledge transfer to other Network researchers and partners. They will make 2 ArcView extensions, Patch Analyst and Habitat Analyst, available to network members through a distribution webpage and will create a "developer's version", which will allow researchers to modify the products for their specific needs. They will also make a recently created spatial database for boreal Ontario that pinpoints the location of historical aerial photography in relation to past disturbance (horse logging, burns, clear-cutting, etc) available to SFM Network researchers. A spatial decision-surface methodology to undertake trade-off analysis of ecological versus economic implications of natural disturbance management will also be completed this year. The project is evaluating the implications of spatial cutblock constraints on meeting annual allowable cut and habitat expectations.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Robert Rempel

Researchers

67. Sustainable Alternatives To Industrial Forestry In The Gwich'in Settlement Region.

Project andersondsust4

Start Date: April 1, 1998

WHAT RESEARCH IS BEING DONE?

This interdisciplinary investigation of the diversity and productivity of the most northerly permafrost-influenced forest in North America is an original and unique attempt at understanding the dynamics of a forest type that dominates the economy of many First Nations communities. The research will be directly relevant for economic diversification in the Gwich'in Settlement Region as well as generating a baseline model for the sustainable development of forest resources in the absence of commercial pressure from industrial interests. We have conducted an interdisciplinary investigation of the patterns of forest use in the Gwich'in Settlement Region, including cataloguing the traditional style of tree selection and use, and retrieving information on historic forest use by steamships and trading posts in the region. We will now use this knowledge of traditional and historic land use to build a model of sustainable forest use for the Gwich'in Settlement Region. This model will form a central pillar in the sustainable forestry management plan of the Gwich'in Renewable Resource Board. Ethnographic research on existing forest use will be extended to sites upriver from the communities of Fort McPherson and Tsiigehtchik. Our team will add quantitative indicators in order to assess the potential for this treeline forest to regenerate.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Ross Wein, **David Anderson**

Researchers

66. The Present: Impacts Of Forest Management And Climate Change On The Carbon Budgets Of Canadian Boreal Forest, Peatland, And Lake Ecosystems.

Project appsmthep4

Start Date: April 1, 1998

WHAT RESEARCH IS BEING DONE?

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Mike Apps

Researchers
Ellie Prepas, *Dale Vitt*

65. Use Of Tailored Minerals For The Treatment Of Mechanical Pulp Mill Whitewater.

Project duffsuseo4

Start Date: April 1, 1998

WHAT RESEARCH IS BEING DONE?

This research targets the treatment of thermo-mechanical pulp mill (TMP) whitewater. Closed whitewater systems face serious difficulties relating to paper machine runnability and product

quality. Increased suspended solids content reduces sheet drainage rate and causes plugging problems in the headbox showers and on the papermachine. Increased levels of dissolved and colloidal substances, including inorganics, resin and fatty acids, and anionic trash, are responsible for impaired sheet quality, higher incidence of deposits and pitch, increased biological growth, and increased corrosion. In order to remove dissolved organic constituents from TMP whitewater, the use of tailored minerals is under investigation. Tailored minerals are prepared by replacing the naturally present cations (Na+, K+, Ca+2) in the mineral lattice by organophilic, quaternary ammonium cations. Organoclays and organozeolites have been shown to be effective in the removal of aromatic hydrocarbons, chlorinated alcohols, and chlorinated hydrocarbons. Application of tailored minerals in adsorption offers several advantages including large mineral deposits, relatively low cost of minerals and cations, possible regeneration, and versatility in the preparation of tailored minerals for target pollutants.

WHERE IS THE RESEARCH BEING DONE?
British Columbia

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Sheldon Duff

Researchers

64. Establishment Of Framework And Baseline Conditions For Ecological Monitoring And Assessment Using Fish Communities Of The Boreal Forest Region.

Project dixondesta3

Start Date: November 21, 1997

WHAT RESEARCH IS BEING DONE?

This project is designed to develop and optimize biological monitoring (BM) tools for assessing the impacts of stressors on aquatic organisms in stream and river systems. BM is required to understand if the stressors associated with forestry activities have undue influence on aquatic resources. At present there are three classes of monitoring endpoints that can be used in BM: population characteristics of individual fish species, fish community characteristics, and benthic invertebrate community characteristics. Population and community characteristics from reference sites are used to establish the "normal range of variation" in indices of composition. Indices from test sites are then judged relative to the normal range of variation from reference sites. Values lying outside the normal range of variation are used to suggest that stressors at the test site have had an undue influence on ecosystem attributes. A number of unresolved questions have resulted in controversy over the usefulness of the approach. What is the normal range of variation in each of the indicators? What causes the variation? Which of the three indicators are optimal? Are they linked or do they tell you difference things? What are the optimal statistical methods for establishing that change has occurred? When does the variability at a test site fall sufficiently outside of the normal range of variability to warrant remedial action? This group is working to resolve these issues to enhance the utility of, and confidence in, biological monitoring.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
D.G. Dixon

Researchers

63. Advanced Oxidation Processes (AOP), Especially Photocatalytic.

Project langfordcadva3

Start Date: July 18, 1997

WHAT RESEARCH IS BEING DONE?

This project will evaluate the novel and emerging advanced oxidation process based on TiO2 photocatalysis, and compare it to biological and ozonation treatment of pulp mill streams. Photocatalytic processes based on the adsorbent photocatalysts are effective for oxidation of all of the major classes of compounds that occur in pulp mill waste streams. In this project, we will determine specific opportunities to insert photocatalytic treatment into the mill process stream, and, for key cases, develop kinetic and engineering parameters to permit technical and economic evaluation. We will also link our analytical parameters directly to regulatory standards. The emphasis this year will be on the analytical parameter definitions.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Cooper Langford

Researchers

62. Exposure Assessment Of Air Pollutants From The Forest Industry.

Project kindzierskiwexpo3

Start Date: April 4, 1997

WHAT RESEARCH IS BEING DONE?

Question: What are the impacts of the available fibre processing alternative from sulfur dioxide? Results to date: Determination of impact of emissions of combustion gases like sulfur dioxide from fibre processing facilities are often undertaken with models and comparing model results with (provincial) air quality guidelines. Current research program emphasizes measurement of combustion gas concentrations at receptor-locations as a measure of what actually occurs. Research is still in progress to acquire suitable background air concentrations of sulfur dioxide in two communities. Management Considerations: Current views of sulfur dioxide emissions from fibre processing facilities are that off-site impacts can occur and that modeling can be use for understanding the extent of these impacts. Receptor exposure is a necessary component for impacts to occur and current impact assessment modeling approaches routinely presume this. These approaches more often lead to over-prediction of extent of impact with the degree of over-prediction unknown. Receptor-based monitoring provides a reality check of environmental behavior at receptor locations and is a much better predictor of potential impact. Intent of research in progress is to lead to improved understanding of effect of sulfur dioxide emissions to atmosphere by characterization at receptor locations.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Warren Kindzierski

Researchers

61. Caribou Mountains Research Partnership.

Project maclockrcari3

Start Date: April 1, 1997

WHAT RESEARCH IS BEING DONE?

Question: Can we describe and model the relationships between landscape features and water quality in undisturbed watersheds? And can we predict the likely outcome in water quality if the landscape undergoes changes due to disturbance? Results to date: Two years of data suggest forest fire has a profound impact on surface water quality in peatland dominated watersheds with discontinuous permafrost. These data are currently being compiled into a manuscript. The most profound impacts were on nutrient concentrations which increased a mean 3-fold for TP. Attempts to model water chemistry from watershed features failed forcing a new method for defining source areas. I have employed a form of hydrograph separation and the results are promising. With the method employed I will be able to determine the aerial extent of areas that contribute water to streams and then model stream and lake chemistry as a function of landscape features within the source area. Management Considerations: A relatively small area within the peatland dominated watersheds of northern Alberta actually determines surface water chemistry and quality. This means that management efforts should be focused on preserving the integrity of areas such as fens and intermittently inundated bogs. The approach I am proposing for determining the location of source areas will allow for a basin specific assessment and result in better planning for selecting harvestable timber areas. Deliverables: The project will provide a tool for determining the potential impacts of disturbance, particularly timber harvesting, on surface water quality. The model will allow for planning of timber harvesting customized for the variability in vegetation and hydraulic source areas for each basin. It will require limited sampling (baseflow and peakflow) from streams for each basin modeled. The final output from the model will be an area overlay on vegetation maps that describes the source areas for water and their relative importance

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
R. MacLock

Researchers

60. Critical Environmental Components: Socioeconomic, Situation And Environmental Health Of Indigenous Communities.

Project crabbépcrit3

Start Date: April 1, 1997

WHAT RESEARCH IS BEING DONE?

Question: How do males adapt to changes in their environment? Results to date: Cumberland House Cree Nation is interested in the question and in the whole approach. There is a possibility

that Cumberland House will conduct a similar project, utilizing the developed methodology and consulting both with LLRCN and IREE. Management Considerations: The results of the report add to the weight of evidence that the Forest industry related jobs are of critical importance for First Nation communities. The results are relevant for hiring practices, level of mechanization and funding for employment training.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Phillipe Crabbé

Researchers
Lloyd Benedict, *George Haas*

59. Development Of An Integrated Approach For Decision Making In Sustainable Forest Management.

Project bouthillierldeve3

Start Date: April 1, 1997

WHAT RESEARCH IS BEING DONE?

Forest stakeholders are demanding that forest management guarantee the conservation of biodiversity and ecosystem productivity while maintaining resources for all users, including the production of wood at a reasonable cost. The industry and other concerned groups need tools that integrate and predict the state of key indicators after different management scenarios. The primary goal of this project is to develop a process, which is founded on sound scientific principles, for decision making in sustainable forest management. This project will provide the industry and other concerned groups with tools, that are compatible with the Canadian Council of Forest Ministers (CCFM) and certification bodies (CSA, ISO and FSC) sustainability criteria and can be used to make decisions concerning the use of forest resources. Specifically, this project will: 1. Further develop and integrate indicators of sustainability at an operational level; 2. Answer the scientific needs of the forest industry and forest communities with respect to better understanding and evaluation of the forest resource; 3. Integrate and exchange information with different research projects from within the SFM Network and elsewhere; and 4. Test the validity of these decision making tools in a chosen territory. The primary products of this project will be the integration of biophysical and socio-economic research into indicators of sustainable management from across the country, the development of landscape and stand level simulation tools for scenario testing, and the development of a social learning process for use in forest management decision making.

WHERE IS THE RESEARCH BEING DONE?
Quebec

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Luc Bouthillier, **Christian Messier**

Researchers

58. Effects Of Changes In Forest Structure Following Thinning Of Lodgepole Pine On Biodiversity.

Project reidmeffe3

Start Date: April 1, 1997

WHAT RESEARCH IS BEING DONE?

Question: Do changes in forest structure associated with commercial thinning affect patterns and diversity and abundance of Scolytid bark beetles? Results to date: Scolytid beetles were captured in funnel traps baited either with pheromones ipsdienol or lanierone, or with a tree volatile a-pinene in four commercially thinned stands and their unthinned counterparts for the first three years following harvesting. Preliminary analyses suggest that species evenness, and therefore diversity, is not significantly different between stand types. Two species were much more abundant than any other: the striped ambrosia beetle Trypodendron lineatum and pine engravers, Ips pini. These two species were significantly more abundant in thinned stands that in unthinned stands. However, pine engraver abundance significantly decreased in the second and third year after thinning compared to the first year after thinning. These results suggest that habitat abundance, and not microclimate, determines patterns of bark beetle abundance. Management Considerations: Forest managers should be concerned with the large increase in bark beetle abundance following thinning. Thinning is characterized by a large, instantaneous input of coarse woody debris followed by normal input rates. Consequently, there is abundant bark beetle habitat immediately following thinning which results in large increases in the number of pine engravers and Trypodendron lineatum, followed by periods of little bark beetle habitat. Pine engravers may pose a risk to living trees in the second and third years following thinning due to small inputs of fresh coarse wood debris, potentially forcing pine engravers into living trees. Trypodendron lineatum may also attack log decks remaining in stands following harvesting during the period of low coarse woody debris input following thinning. Given the habitat requirements for these species, forestry companies should remove large pieces of fresh coarse woody debris created during

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Mary Reid

Researchers

57. Effects Of Landscape And Local Scale Modifications (Natural Or Human) On Snag Abundance And Use By Wildlife In The Boreal Black Spruce Forest.

Project desrochersaeffe3

Start Date: April 1, 1997

WHAT RESEARCH IS BEING DONE?

Question: How does the three-toed woodpecker, a species potentially sensitive to clearcutting, respond to current management by Donahue? Results to date: Woodpeckers are present in residual forest fragments, and densities in these remnant are comparable to those in uncut forest (thus overall numbers are greatly reduced until mature forests return). Forest remnants allow for successful reproduction of the species, but entail increased foraging costs owing to their linear shape. Long term effect of reduced population is unknown. Management Considerations: Should provide larger and less linear remnant mature stands to 1) decrease the chances of woodpeckers

and species with similar requirements and 2) allow comparison between alternative management methods. Other Questions Under Consideration: Single-species studies like this are vital to gain a better understanding of wildlife response to logging. However, wildlife study will require long-term data and long-term financial commitment to provide more useful answers.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
André Desrochers

Researchers
D. Bordage, Marcel Darveau, J. Savard

56. Impact Of Forest Fires And Logging Activity On Mercury Loading In Lakes In The Boreal Forest.

Project mucciaimpa3

Start Date: April 1, 1997

WHAT RESEARCH IS BEING DONE?

Question: Did the modification of surface runoff from the watershed, following forest fires or logging activity, affect Hg loading in lakes and its availability to the aquatic biota? Results to date: A preliminary statistical analysis of the dissolved methyl-mercury concentrations in the water column with respect to watershed perturbations (i.e., forest fires, clear-cutting) is inconclusive. Unfortunately, we are missing the single most important component of the water column, the suspended particulate matter (SPM), which could not be sampled properly. Sampling was carried out by another network group and we were not allowed to participate. Despite two attempts using revised protocols and equipment, sampling of the SPM was unsuccessful. Management Considerations: Adaptation of logging practices in order to minimize surface runoff and erosion of the top-soil leading to the transport of dissolved organic substances and associated metal contaminants to the lakes. Deliverables: M.Sc. thesis by June 1999 Other Questions Under Consideration: 1. How much of the mercury transported from the catchment is incorporated into periphytonic algae? 2. What is the contribution of periphytonic algae to the transfer of mercury to fish in boreal lakes? 3. Are periphytonic algae significant methylators of mercury? 4. What environmental conditions are conducing to mercury uptake and methylation by periphytonic algae?

WHERE IS THE RESEARCH BEING DONE?
Quebec

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Alfonso Mucci

Researchers

55. Minimizing Environmental Impact From Wood Processing Operations.

Project duffsmini3

Start Date: April 1, 1997

WHAT RESEARCH IS BEING DONE?

The Canadian forestry industry has invested considerable effort into maximizing the economic gain from logging operations. This has been accomplished through a wide range of activities aimed, in part, at maximizing the use of lumber and lumber by-products. Examples include improved handling and preservation of cut wood to minimize loss of values, cogeneration of steam and electricity from wood wastes, production of products such as medium density fibreboard, and improved efforts to produce finished products such as window frames from waste materials. Despite the many gains made by the industry, a number of environmental challenges remain. The manufacture of medium density fibreboard (MDF) generates a waste stream contaminated with extractives and volatiles. Negative environmental effects associated with the use of pentchlorophenol (PCP) as a wood preservative has led to the substitution of other chemicals such as NP1; however, the research necessary to fully understand the impact of NC1 on the environment has lagged behind. Dry land sorts produce run-off and leachate which may be contaminated with wood extractives. In this study, graduate students will characterize each of these waste streams to determine if any environmental concerns exist, and is so, develop remediative strategies or technologies which are applicable in remote areas.

WHERE IS THE RESEARCH BEING DONE?
British Columbia

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Sheldon Duff

Researchers
Richard Branion, *Peter Hodson*, *John Saddler*

54. Nutrient Cycling In The Forest Floor And Mineral Soil Of The Boreal Forest.

Project mcgillbnutr3

Start Date: April 1, 1997

WHAT RESEARCH IS BEING DONE?

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Bill McGill

Researchers

53. Response Of Forest Products Firms To Demands For Sustainable Forest Management.

Project vertinskyiresp3

Start Date: April 1, 1997

WHAT RESEARCH IS BEING DONE?

Question: What policy approach to sustainable forest management works best and under what cicrumstances? Results to date: We have used both theoretical analyses, national case studies and in-depth corporate behaviour studies. Our theoretical analyses favoured the increased use of economic instruments to encourage SFM. Economic instruments are favoured because the both

encourage efficiency of resource allocation and permit innovation. Our empirical studies, however, showed that despite their theoretical attractiveness, economic instruments are not widely used and when they are used, they do not yield the expected results (Indeed, firms occasionally do not adopt changes that will result in win-win solutions where both the environments of the forest are protected and profits increase). There are many reasons for this. Scientific uncertainty about what constitutes SFM makes the application of economic instruments difficult and encourages governments to regulate solutions (which may be suboptimal but meet public perceptions of what constitutes SFM is some salient attributes). Political forces and established patterns of firm behaviour also inhibit the use of economic instruments. Our studies suggest that understanding firm behaviour and the politics of SFM is important in designing policies for SFM. We also show the importance of voluntary over-compliant behaviour of firms and suggest means to encourage such behaviour. Management Considerations: A forestry manager should appreciate the degree of fluidity of both the definitions and the governance system that characterize societal efforts to bring about SFM. It means that when thinking about forestry practices, one needs to consider not only the economic and ecological variables, but also the political and institutional variables (including communications and public perception). SFM means constant learning and thus requires incorporation of intensive programs of training. The development of means for learning and traini

WHERE IS THE RESEARCH BEING DONE?
British Columbia

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Ilan Vertinsky

Researchers

52. Management Decision Structure And Aesthetic Perception Of Succession Forest Stages.

Project nelsontmana2
Start Date: March 25, 1997

WHAT RESEARCH IS BEING DONE?

This project applies psychological methods to investigate human perceptions of forests to aid in forest planning and decision making. Although the public is increasingly critical of the use of forested lands, public perceptions of forest ecology are incompletely understood and may not reflect accurate knowledge of modern silviculture. The extent to which perceptions of managed forests is congruent, incongruent, or independent of approval of scientific approaches to forest management is unknown. This project uses data to investigate whether public acceptance of forestry practices is influenced by the type of management decision presented, the age, gender and education of the respondent, and the community and type of forest landscape rated. To date, researchers have measured public perceptions of alternative forest landscapes that represent various stand successional processes and management regimes. They first investigated the degree of acceptance such forest landscapes evoke in communities with different economic bases, and the extent to which acceptance is affected by whether information is provided by the forest industry as opposed to a wilderness conservation group. Subsequently, the researchers investigated the extent to which acceptance of forest landscapes is influenced by whether decisions regarding forest management practices are made by the forest industry and provincial government alone, or with the participation of communities.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Thomas Nelson

Researchers
Andreas Hellum, *Terry Taerum*

51. Life Cycle Analysis For Sustainable Forest Management.

Project hallelife2

Start Date: February 27, 1997

WHAT RESEARCH IS BEING DONE?

This project looks at the wood pulping activities of Alberta-Pacific Forest Industries Ltd. in the boreal forest, in order to: 1) Develop a dynamic life cycle inventory (LCl) tool linking the activities at the forest level with the mill; 2) Assess the changes in the inputs/outputs of the life cycle system as a function of a shift in fibre supply from extensive to intensive forest management (tree plantations). The project will focus on compiling an inventory database of the input and output flows of materials and energy (pollutant emissions, and energy and raw materials consumption), and economic costs, as well as pertinent ecological and socioeconomic issues (such as natural habitat depletion, jobs, etc.) associated with the forest and mill activities. The key questions to be addressed are: 1. What are the environmental, ecological, and socioeconomic future consequences and trade-offs, at the linked forest and mill level, of shifting fibre supply from extensive management of the boreal forest toward intensive forest management? 2. How do those consequences and trade-offs change, given the data uncertainties and differing "what if" scenarios of forest and mill operations now and in the future? The insights and conclusions gathered through this project should directly assist the evaluation of the potential and desirable time frame for intensive forest management as an integral constituent of a strategy for sustainable management of the boreal forest.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Eric Hall

Researchers
Vic Adamowicz, *Christian Messier*

50. Membrane Bioreactors For Contaminant Control In Closed Pulp And Paper Mills.

Project hallememb2

Start Date: February 27, 1997

WHAT RESEARCH IS BEING DONE?

Recovery plant condensates and bleach plant filtrates contribute more than 60% of the total effluent flow in most bleached kraft pulp mills. Therefore, reuse of the recovery cycle condensates and bleach plant filtrates would significantly reduce the quantity of effluent

discharged. Recovery cycle condensates and the bleach plant filtrates contain contaminants which must be removed before they can be easily reused as process feedwater. Previous work in this project investigated removal of the contaminants of concern using a high temperature membrane bioreactor (MBR). The system was found to have excellent potential for application to full-scale treatment. However, insufficient information is available regarding the performance of this system under mill-scale operating conditions. The present study will focus on demonstrating the efficacy of the high temperature MBR process under typical full-scale design conditions. Mill-site treatment systems will also likely be subject to shock loads and rapid temperature changes resulting from upsets in the pulp mill. Therefore, the other main objective of this study is to demonstrate the effects of transient operating conditions, representative of those expected for a mill-site application, on the system. Our focus for this part of the project will be on fluctuations in organic concentration and temperature.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Eric Hall

Researchers
William Mohn

49. Large Scale Issues Of Sustainable Forestry: Statistical Methods And Tools For Cross-Scale Modeling.

Project bunnellflarg2

Start Date: January 1, 1997

WHAT RESEARCH IS BEING DONE?

This research is closely linked to the Beck proposal described earlier. Researchers will first develop statistical models and simulation tools to study the interactions between forestry practices, fire and stand dynamics, and their effect on wildlife habitat. The second component of this research involves evaluating the economic and ecological tradeoffs between management scenarios over forested areas of intermediate size (up to 1 million ha) at operational resolution (about 10ha). Thirdly, researchers will develop and apply cross-scale methods to generalize the results of intensive, detailed field studies up to the operational scales of our models, and to the strategic scales studied by Beck. Finally, the project will attempt to clarify, through simulation, some alternative hypotheses about boreal mixedwood landscape dynamics.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Fred Bunnell

Researchers
Fiona Schmiegelow, Carl Walters

48. Biodiversity Assessment Project Round 2: Redesign And Analysis Of Alternative Forest Management Strategies.

Project doyonfbiod2

Start Date: August 15, 1996

WHAT RESEARCH IS BEING DONE?

This project compares the performance of bioindicator models under alternative forest-management strategies over the long term. In the coming year the researchers intend to finalize the development of the biodiversity models and apply them using forest projections previously designed. They will then analyze and interpret the results in order to formulate a new suite of forest management strategies that attempt to improved expected biodiversity response. Using these new projections, researchers will re-apply the biodiversity indicator models and summarize and interpret biodiversity performance. Subsequently a research program that involves field-testing will be conducted to strengthen the models - with emphasis on validating the Habitat Suitability Index Models. The field work will focus on surveying habitat use of populations of selected species, studying the temporal dynamics of habitat structural elements required for these species, and studying how these dynamics are modified under the different silvicultural systems.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Frederick Doyon

Researchers
Peter Duinker

47. Development Of Simulators For In-Plant And Ex-Plant Biological Treatment Systems.

Project halledeve2

Start Date: August 11, 1996

WHAT RESEARCH IS BEING DONE?

The goal of this research project is the development of a dynamic, computer-based simulator for external and internal pulp and paper wastewater treatment systems. The need for simulation tools for the forest products industry is indicated by the periodic unanticipated treatment process upsets experienced by many mills, the most serious consequence of which may be aquatic toxicity breakthrough. At present, the occurrence of a treatment process upset may result in mill shut down for as little as a few days, or as much as a few weeks. Furthermore, once a mill has been shut down, the best procedure for regaining control of treatment plant performance is often not obvious. Computer-based simulators could provide valuable, rapid assistance for evaluating alternative courses of action that might restore treatment plant performance. When an appropriate course of action has been identified, simulation could then be used to estimate the time required to re-establish treatment process integrity and to decide how the mill should be restarted to avoid any further treatment process upset. The product of this research will be software that can simulate the dynamic performance of treatment systems with waters containing contaminants that are specific to the forest products industry. Simulators could be used by treatment process designers and pulp mill staff that are responsible for treatment process operation.

WHERE IS THE RESEARCH BEING DONE?
British Columbia

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Eric Hall

Researchers
Peter Dold, *William Mohn*, *Jules Thibault*

46. Integrated Tools For Decision Aid In Sustainable Forest Management.

Project waaubjinte2

Start Date: August 11, 1996

WHAT RESEARCH IS BEING DONE?

Long term sustainable development of the forest is best achieved by considering the different uses of the forest (wood harvesting, biodiversity, survival of communities, etc.), and thus by merging various information sources describing the territory (harvest plans, intervention technology, biodiversity assessment, watershed modeling, forest fire susceptibility, landscape aesthetics, First Nations way of life, etc.), and by taking into account environmental concerns at the early stages of forest management scenario design. However this approach demands that a complex set of tools and data be assembled, and that the utilization of these be facilitated in order for the planners to efficiently reach decisions. The goal of this project is to develop and test a decision support system based on digital geographical data and on a regrouping of different existing software packages under a unique accessible interface. This system will be mainly composed of a geographical information system (GIS) and a multicriteria analysis package. Implementation of the decision system will require analyzing spatial data to evaluate the score for each criteria as a function of location (e.g.: wood yield per stand, etc.). At the same time, various forest users will be consulted to establish different management scenarios and to evaluate these using a multicriteria multi-stakeholders approach. An integrated computer interface will be developed to allow non-experts to access the database and efficiently test scenarios. This research project will integrate results from other Network projects and will be conducted with the collaboration of forest companies.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Jean Waaub

Researchers
Louis Bélanger, *Yves Bergeron*, *Benoit St-Onge*

45. Large Scale Issues In Sustainable Forestry: Landscape Simulation Of Stand Dynamics, Harvesting And Fire.

Project beckjlarg2

Start Date: August 11, 1996

WHAT RESEARCH IS BEING DONE?

This proposal contributes to the overall goals of the modeling research group by developing tools and methods to study the interactions between policy and natural processes. Researchers use tools to evaluate both ecological and economic tradeoffs between alternative policy options over large forest estates (up to 10 million ha), at a resolution consistent with strategic forest planning (compartments such as townships of about 10,000 ha). The specific policy domains being considered include forest tenure arrangements, reserve design strategies including "Triad" management, and harvest scheduling methods intended to emulate (or not) the natural disturbance regime.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Jim Beck

Researchers
Vic Adamowicz, *Fred Bunnell*, *Fiona Schmiegelow*, *Carl Walters*

44. The Economics Of Climate Change And The Role Of Forestry In Canada.

Project vankootengthee2

Start Date: August 11, 1996

WHAT RESEARCH IS BEING DONE?

Question: How much does it cost society to remove carbon from the atmosphere using forest strategies? Results to date: We calculated the costs of C uptake on marginal agricultural land in Alberta and NE British Columbia. Some 1.8 million ha of land currently in forage production is available in this region, 1.6 mil ha of improved pasture and 3.6 mil ha of unimproved pasture. Total area available is reckoned to be 7 mil ha and we assume that hybrid poplar is planted. When physical C is discounted at 4% (0%), afforestation of land in forage results in C-uptake costs of $71.89-$190.16 per tonne ($28.90-$76.44 per t). Costs on improved pasture lands are $20.95-$46.87 per t ($8.42-$18.84/t), while they are $20.95-$26.17 per t ($8.42-$10.53/t) on unimproved pasture. Management Considerations: When replanting recently harvested areas, the forest manager needs to consider planting fast growing species, such as hybrid poplar, as opposed to more traditional species that might yield greater financial returns (e.g., spruce that can be used for lumber). In addition to taking care to plant the appropriate species, ones that take into account carbon uptake as well as financial returns at the end of the rotation, the manager needs to consider the life of the carbon in the products. Further, it is important to consider afforestation, types of species to be planted on marginal agricultural lands (again hybrid poplar is important purely for C uptake) and the effect of large-scale planting on agricultural land on the availability of fibre in the future. Deliverables: E. Krcmar-Nozic, M. Leon, B. Stennes, and G.C. van Kooten. "Economics of Carbon Uptake by Planting Trees on Marginal Agricultural Land in Alberta and BC". Working Paper in progress. Other Questions Under Consideration: 1. Should and can Canada rely on forest policies to help it achieve Kyoto Accord targets? 2. What are the tradeoffs between fibre supply and economic returns when C-uptake targets are met? 3. How does on

WHERE IS THE RESEARCH BEING DONE?
British Columbia

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
G. Cornelis van Kooten

Researchers

43. Whitefish Lake First Nation Land And Resource Use Study: Incorporating Traditional Knowledge With GIS Technology.

Project hickeycwhit2

Start Date: August 11, 1996

WHAT RESEARCH IS BEING DONE?

Question: Can a cooperative forest management agreement between First Nations, Provincial Government, and Industry be implemented to ensure sustainable forestry that is acceptable to all sides? Results to date: Implementation of Whitefish Lake First Nation (WFLFN)-Province of Alberta Memoranda of Understanding and Agreement have been fulfilled, and extended to wildlife, commercial fishing, and heritage sites. Harvesting plans have been negotiated between the WFLFN and Industry, based on land use studies, local cultural values, and economic development strategies. Management Considerations: Involvement of First Nations can be a positive experience for all sides, with proper respect for all positions and solid planning and research built into the process. The parties' disparate goals need not be irreconcilable nor need positions be antagonistic. Deliverables: Implementation agreements and structures; land use studies; Geographic Information System database; on-reserve, as well as on-university campus, GIS capacity. Other Questions Under Consideration: 1. Can a traditional Land Use and Occupancy Study contribute to the development of a forest management agreement? 2. Can on-reserve capacity be developed to store and update Traditional Land Use and Occupancy information? 3. Can land reclamation be undertaken on abandoned oil and gas well sites by aboriginal communities?

WHERE IS THE RESEARCH BEING DONE?
Ontario

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Cliff Hickey

Researchers

42. Ecosystem Management Emulating Natural Disturbance (EMEND).

Project spencejecos2

Start Date: August 10, 1996

WHAT RESEARCH IS BEING DONE?

Question: How much variation exists among the stands selected to represent cover types in the EMEND experiment? Results to date: So far, we've collected data to provide a provisional answer to this question before manipulation with respect to mensurational characteristics, coarse woody debris and shrub cover. However, we are just now entering and analyzing these data. Based on the smaller 1997 data set about mensurational characteristics, the 4 cover-types clearly do represent rather distinct communities based on volume and relative ages of aspen and spruce in the stands. A better, more relevant answer will be available as soon as the data from 1997 and 1998 can be integrated. Management Considerations: Differences in response among the 4 cover-types will indicate that each forest type should be considered separately in management. Deliverables: Overall, the EMEND experiment will provide detailed guidance on what management conventions should be adopted to meet sustainability criteria. Other Questions Under Consideration: 1. Which forest harvest and regenerative practices best maintain biotic communities, spatial patterns of forest structure, functional ecosystem integrity in comparison with mixed-wood landscapes that have arisen through wildfire and other inherent natural disturbances? 2. Workers funded to work on Legacy 2 issues are developing and employing economic and social analyses to evaluate these practices in terms of economically viability, sustainability and social acceptability.

WHERE IS THE RESEARCH BEING DONE?

Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
John Spence

Researchers
Victor Lieffers, *S. Ellen Macdonald*, *Ken Mallett*, *W. Volney*

41. Biofiltration Of Gaseous Emissions From Forest Products Manufacturing.

Project colemanrbiof2

Start Date: May 31, 1996

WHAT RESEARCH IS BEING DONE?

Question: What is the effect of silicone oil on the biofiltration of hydrophobic gaseous contaminants? Results to date: Biofiltration experiments showed enhanced n-hexane removal capacities with the addition of silicone oil to the biofilter matrix. However, other factors including moisture content and pH of the matrix influenced biofilter performance. Management Considerations: Biofiltration of hydrophobic gaseous contaminants is difficult. The addition of silicone oil can enhance removal of such contaminants. However, the cost of silicone oil addition to a large on-site biofilter must be considered. Modifications to the support matrix and careful control of the matrix moisture content and pH may enhance biofilter performance and alleviate the need for silicone oil addition. Other Questions Under Consideration: 1. What are the effects of inocula and type of biofilter matrix on biofiltration of DMS? 2. What is the effect of varying DMS loading on biofilter performance? 3. Can a bacterial-produced surfactant enhance biofilter removal of hydrophobic contaminants? 4. What would be the best biofilter configuration for operation on-site at a pulp mill to treat hydrophobic gaseous emissions?

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Richard Coleman

Researchers
D. Grant Allen

40. Enzyme And Microbial Treatment Of Concentrated And Recycled Pulp Mill Effluents.

Project saddlerjenzy2

Start Date: May 31, 1996

WHAT RESEARCH IS BEING DONE?

In response to environmental pressures, pulp and paper mills will be required to use and discharge less water. More of the process waters will be retained and processed on the mill site. Thus, closed cycle systems will become standard in the future, providing benefits of lower effluent treatment costs, energy savings, lower water consumption, and improved environmental performance. However, increased closure of the mill will cause buildup of dissolved and colloidal substances resulting in problems with corrosion, increased deposits, reduced drainage

rates, odour, interference with papermaking chemicals and reduced paper quality. The objective of this project is to develop a process based on fungi/enzymes that can alleviate the problems associated with build-up of dissolved and colloidal substances during mill closure. We have recently found that fungi and fungal culture filtrates are able to degrade the detrimental dissolved and colloidal substances in the process waters of mechanical pulp mills thus providing an opportunity to alleviate the problems encountered in mill closure. We hypothesize that it should be possible to remove the detrimental lipophilic substances from the process waters in mechanical pulp and paper mills with a fungal/enzyme process. In this project, we will answer the following key questions: 1. How do the fungi/enzymes perform in a larger scale continuous process? 2. What are the process parameters for an industrial scale treatment?

WHERE IS THE RESEARCH BEING DONE?
British Columbia

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
John Saddler

Researchers
Roger Beatson

39. Use Of Immunoassays To Monitor In-Mill And Waste Water Concentrations Of Hydroogen Sulfide In Ambient Air.

Project saddlerjuseo2
Start Date: May 31, 1996

WHAT RESEARCH IS BEING DONE?

In order to conserve water and minimize the impact of discharges to the receiving waters, pulp and paper mills are moving toward higher degrees of closure of their water systems. As less water enters the mill and more of the contaminated water is recycled, dissolved and colloidal substances accumulate in the process waters. These substances can cause problems in paper quality and papermachine runnability. To control these problems, a simple and rapid method of measuring the concentration of the detrimental substances in the process waters is required. The objective of this project is to determine if immunoassays can provide such a rapid on-line method. Immunoassays are specific and capable of rapidly measuring the concentrations of substances such as toxic chemicals and industrial pollutants in complex matrices. The premise of this research is that immunoassays may provide a rapid and simple means of detecting the detrimental lipophilic substances in the process waters of mechanical pulp mills. The following key questions will be addressed: How do the results from immunoassays compare with those from separation/gas chromatography? What are the best classes of compounds to target with an immunoassay for assessment of the detrimental effect of lipophilic substances? Can a rapid on-line method based on immunoassay be designed for use in a pulp mill?

WHERE IS THE RESEARCH BEING DONE?
British Columbia

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
John Saddler

Researchers
Roger Beatson, *Collette Breuil*, *Eric Hall*

38. Biofiltration Of Gaseous Emissions From The Forest Products Industry.

Project allendbiof2

Start Date: April 28, 1996

WHAT RESEARCH IS BEING DONE?

This project is using biofilters to treat hydrophobic compounds present in air emissions from the forest products industry, with the specific focus of examining how variable emissions (i.e., waste gases with fluctuating concentrations of the pollutant) influence the performance of a biofilter. The objectives of this research are to examine the impact of cyclic pollutant loading on biofiltration performance and the effect of cycle amplitude and period on performance. The project will investigate how to model the kinetic behaviour of cyclic loading to a biofilter and the transient response of the biofilter. The project will also examine how a homogeneous engineered natural packing material can be used to ensure optimum performance of the biofilter. This work will involve running three parallel bench scale biofilters, two operating at variable loading rates, and the third serving as a control and operating with a constant concentration stream.

WHERE IS THE RESEARCH BEING DONE?
Ontario

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
D. Grant Allen

Researchers

37. Development And Verification Of A Two-Dimensional Hydraulic And Kinetic Model For The Prediction Of Effluent Transport In Rivers.

Project putzgdeve2

Start Date: April 28, 1996

WHAT RESEARCH IS BEING DONE?

Question: Can the two-dimensional mixing model successfully simulate effluent mixing over a wide range of river flow conditions (low flow under ice cover to high summer flow)? Results to date: The results of the 1997 field work, together with previous tracer test conducted on the Athabasca River downstream of Alberta Pacific Forest Industries Inc., have demonstrated the model can simulate effluent mixing over a wide range of flow conditions. The dimensionless transverse mixing coefficient for the river reach was quantified using tracer tests and model analyses. The dimensionless mixing coefficient remained reasonably consistent over the range of flows for which tests were conducted. Management Considerations: Mixing zone water quality surveys downstream of mill discharges should be planned with the aid of a two-dimensional river mixing model to ensure sampling locations are representative of effluent plume and peak effluent concentrations in the receiving stream. Water quality impact in the mixing zone during low flow conditions should be assessed with the aid of a two-dimensional river mixing model. Mixing characteristics measured at higher flow conditions can be utilized to model the low flow, higher impact conditions. Other Questions Under Consideration: 1. Can the two-dimensional mixing model be successfully adapted to predict the mixing and in-stream reaction of water quality components such as colour, COD and AOX? Analysis and modeling of the 1998 field data will address this question.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Gordon Putz

Researchers
Daniel Smith

36. Microbial Ecology Of Toxic Compound Removal In Biological Treatment Systems.

Project mohnwmicr2

Start Date: April 28, 1996

WHAT RESEARCH IS BEING DONE?

Question: Can resin acid-degrading microbial populations in biological treatment systems be manipulated to improve performance and stability of those systems? Results to date: Resin acid-degrading bacteria are diverse; thus, individual species are adapted to a wide range of physicochemical conditions. A number of such species can be cultured and have been characterized in the laboratory. In most cases, these organisms completely destroy (mineralize) resin acids. Molecular probes have been developed allowing one to monitor resin acid-degrading populations in the complex microbial communities in treatment systems. Management Considerations: Biological treatment of resin acids is very effective, since it completely destroys the molecules. In addition to treating effluents, biological systems can probably be useful in recycling of pulp and paper mill process waters and detoxication of runoff from wood handling operations. The diversity of resin acid degraders suggests that treatment systems can be effective under non-traditional conditions (e.g., high or low temperatures, high rates). Also, resin acid degraders with appropriate characteristics may be useful as inocula for reactivating treatment systems on occasions when transient stresses inhibit detoxication of wastewater. Molecular probes are allowing us to measure kinetics of growth and metabolism of resin acid degraders in complex treatment system communities. The resulting data can be used to model these populations and these models can be incorporated in treatment system operation and design. Deliverables: 1. Fundamental knowledge about resin acid-degrading organisms and the biochemistry of resin acid biodegradation (publications). 2. Molecular probes to monitor populations and their metabolic activity. 3. Inocula of potential use in reactivating inhibited treatment systems. 4. Kinetic data on growth and metabolism of resin acid degraders. Other Questions Under Consideration: 1. What are the physicochemica

WHERE IS THE RESEARCH BEING DONE?
British Columbia

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
William Mohn

Researchers
Sheldon Duff, Eric Hall

35. Supercritical Water Oxidation Of Pulp Mill Sludges, Model Compounds And Various Pulp And Paper Mill Internal Recycle Streams.

Project branionrsupe2

Start Date: April 28, 1996

WHAT RESEARCH IS BEING DONE?

This research is directed at measuring the rates at which various materials can be oxidized in a supercritical water reactor so that reactor design procedures can be improved. Under supercritical conditions (high temperature and pressure), water does not behave as ice, liquid water, or steam, but as a homogeneous fluid which can act as a solvent for many compounds not normally soluble in water. If oxygen is present in the supercritical water, organic compounds in solution are oxidized to carbon dioxide, water, and other simple molecules. Many toxic materials can be destroyed by this process. If the organic concentration is high enough, excess heat generated by the oxidation reaction can be recovered and used for heating purposes. Studies will begin with model compounds such as glucose before the investigation of organics removal from papermachine white water, wastewater sludge destruction, and other pulp and paper mill waste streams.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Richard Branion

Researchers

34. Emerging Wastewater Treatment Technology For Colour Removal.

Project lavalléehemer2

Start Date: April 1, 1996

WHAT RESEARCH IS BEING DONE?

What is the reactional kinetic mechanism of the process? H-bond is the cornerstone of this mechanism. Some other interactions, e.g., Van der Waals, can be involved in the said process. This finding can be used to explain the action of some polymers on wastewater's pollutants. It also can permit the use of other kinds of polymer for the wastewater treatment.

WHERE IS THE RESEARCH BEING DONE?
Quebec

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Henri-Claude Lavallée

Researchers

33. Genetic Diversity Of Black Spruce After Fire Or After Harvesting With Cut For Regeneration Protection.

Project bousquetjgene2

Start Date: April 1, 1996

WHAT RESEARCH IS BEING DONE?

Black Spruce regenerates in two ways: 1) by seed, given adequate seed bed conditions, e.g. post-fire conditions; and 2) by layering, e.g. populations where harvest with protected regeneration is practised and where accumulation of organic matter prevents seed germination and seedling establishment. The objectives of this project are: 1) to evaluate the genetic diversity and the level of inbreeding of Black Spruce populations regenerated by layering after harvest; and 2) to compare these parameters with those of populations regenerated naturally by seed after fire.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Jean Bousquet

Researchers

32. Key Factors In The Maintenance Of Biodiversity In The Boreal Forest.

Project bergeronykeyf2

Start Date: April 1, 1996

WHAT RESEARCH IS BEING DONE?

This research project is investigating the contributions of critical habitats (mature and old-growth forests) and key environmental features (coarse woody debris: standing dead trees and logs) that are assumed to support important elements of biodiversity in boreal forest landscapes under natural disturbance regime, and evaluating what the key differences are between landscapes under natural disturbances and managed forest landscapes. In the black spruce forest zone of Quebec, biodiversity was measured at stand and landscape levels with four taxonomic groups (vascular plans, non-vascular plants, invertebrates (carabid beetles), and vertebrates (songbirds). For some groups (insects and birds), sampling was extended to cover all the chronosequence in early post-fire sites to old-growth sites. Investigations at the landscape scale for birds and at the stand level for insects in early post fire sites indicate that these habitats hold fire dependent species and habitat characteristics (high densities of snags) that may have an important contribution to biodiversity. This year's work will focus on comparisons of early post fire and clearcut forest landscapes and to finalize the evaluation of biodiversity along the entire chronosequence of the black spruce zone.

WHERE IS THE RESEARCH BEING DONE?
Quebec

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Yves Bergeron, **Pierre Drapeau**

Researchers

31. Late Holocene Climate, Vegetation And Fire Interactions In The Boreal Forest Of The Western Interior Of Canada.

Project campbellilate2

Start Date: April 1, 1996

WHAT RESEARCH IS BEING DONE?

The western boreal forest is structured in large part by fire, with fire return intervals on the order of 100 years or less. Recent increases in fire activity have raised the spectre of future climate warming causing a dramatic increase in fire activity with consequent negative impacts on forestry and forest ecology. By investigating the record of past changes in climate and fire activity preserved in annually laminated lake sediments, this project will provide estimates of the sensitivity of fire activity to climate change at decadal to century timescales. The same records will also provide an indication of the effectiveness of active fire suppression at decadal timescales and large regional scales. It is expected that the recent fire regime, used in determining harvesting regimens, will be shown as either typical or atypical in a broader temporal context. Four study sites have been identified: Amisk Lake (AB), Christina Lake (AB), Fleming Lake (AB), and Jade Lake (SK). These sites represent a climatic and vegetational transect through the low boreal to the high boreal in Alberta, with an additional site in the mid-boreal of central Saskatchewan. This project is integrated with the Forest-Peatlands-Lakes Interactions Project under the Carbon Research Group.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Ian Campbell

Researchers

30. Modeling The Biological And Silvicultural Aspects Of Natural Tree Regeneration And Stand Dynamics In The Boreal Forest At Varying Spatial And Temporal Scales.

Project messiercmode2

Start Date: April 1, 1996

WHAT RESEARCH IS BEING DONE?

This integrated research project will develop and test recruitment models that predict the dynamics of regeneration and growth at both the stand and landscape levels in boreal forests. We will study regeneration after a partial opening in the canopy caused by budworm attack, windthrow, tree mortality or selection cutting and after the complete opening of a site by clearcutting or wildfire. We will focus on events in the first 30 years after disturbance, but predict stand composition and structure up to maturity. The study will have several components: 1) The Seed Production study will test the extrapolation of the single-tree seed production equation to a stand scale (area source). 2) The Seedbed Study will examine the rate at which duff layers aggrade following disturbance and show that the decline in first-year survivorship can be predicted using the ratio of germinant length/duff depth. 3) The Initial Recruitment Model Study will test two spatially explicit models (sexual, asexual) for the various disturbance types as well as in intact forest. 4) The Spatial Pattern Study will model the distribution of distances-to-living-sources (including residual stands) in burns and budworm gaps as an extreme value distribution.

5) The Stand Dynamics Study will evaluate light-driven growth and mortality in young stands using stand reconstructions. 6) The data from these reconstructions will then be used in the Growth Model Study to validate the initialization of the species-specific parameters in a stand-level model built up using a modified version of the SORTIE/BC model. 7) Finally, the Landscape Dynamics Study will employ the functions flowing from these studies to predict post-disturbance species composition, growth rates and tree mortality at the landscape scale.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Christian Messier

Researchers
Yves Bergeron, *Marie-Josée Fortin*, *David Greene*, *Marty Lechowicz*, *Victor Lieffers*

29. Modeling The Long Term Impact Of Harvesting On Soils And Forest Productivity In The Boreal Forest.

Project parédmode2

Start Date: April 1, 1996

WHAT RESEARCH IS BEING DONE?

The main objective of this project is to adapt, calibrate and validate, to a certain extent, simulation models predicting changes in boreal forest productivity as affected by natural and anthropic disturbances. This information will come in the form of a spreadsheet that will provide guidelines to assist forest managers in decisions that may affect soil fertility and the maintenance of forest productivity. To achieve this objective, the project will draw on information generated by this project, other Network projects (Carignan, Munson, McGill), and non-Network projects (Ont. Min. Nat. Res., Bergeron et al. NSERC strategic). This information will be used to: understand how disturbances affect soil nutrient availability through direct losses of nutrients during disturbances (eg. amounts removed in harvested products, amounts of elements volatilized and leached during and following disturbance), changes in species composition (canopy and understory), and changes in soil microclimate; understand, through modeling, laboratory and field experiments, how these controls relate to soil nutrient availability; and establish the relationships between soil nutrient availability and productivity for jack pine and black spruce stands.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
David Paré

Researchers
James Fyles

28. Tracing Carbon And Nitrogen Flow Paths From The Land Of Lake Within Boreal Gorge Basins: An Integrated Field And Modeling Approach.

Project creeditrac2

Start Date: April 1, 1996

WHAT RESEARCH IS BEING DONE?

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Irena Creed

Researchers

27. Use Of Waste Petroleum Coke For Colour Reduction In Wastewater From Pulp Mills.

Project segoduseo2

Start Date: April 1, 1996

WHAT RESEARCH IS BEING DONE?

Question: Can petroleum coke be utilized to produce activated coke with high capacity for color and chlorinated organics reduction in bleached kraft pulp mill wastewater? Results to date: The results showed that activating the petroleum coke for 2 hours has increased its capacity for methylene blue adsorption from 10 g / 100 g of petroleum coke to 25 g / 100 g of activated coke. Increasing the activation time from 2 to 4 hours resulted in slight increase the activated coke capacity for methylene blue adsorption to 27 g / 100 g activated coke. The produced activated was evaluated in terms of color and AOX reduction in Do bleaching stage wastewater results showed that in the carbon dose range of 100 to 1000 mg/L, the highest removal of color and AOX was 22 % and 26 %, respectively. As the carbon dose increased from 5000 to 15,000 mg/L, higher removals were achieved: 93 % for color and 87 % for AOX. These results indicated that petroleum coke could be utilized to produce activated coke with high capacity for color and chlorinated organics reduction in bleached kraft pulp mill wastewater. Management Considerations: Utilizing activated coke for the reduction of color and chlorinated organics would improve the effluent quality of pulp mills and as a result would reduce the environmental impacts on the receiving rivers. Deliverables: Production of valuable activated coke from cheap and abundant source of petroleum coke. The activated coke is capable of reducing, significantly, color and chlorinated organics from bleached kraft pulp mill wastewater. Other Questions Under Consideration: 1. What are the optimum activation conditions required for producing activated coke with high capacity for color and AOX adsorption? 2. What is the rate of adsorption of color and AOX by the activated coke? 3. What is the best method for separating the spent activated coke from the wastewater? 4. How can the spent activated coke be utilized?

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
David Sego

Researchers
Daniel Smith

26. Using Birds For Monitoring The Effectiveness Of Sustainable Forest Management In The Boreal Forest.

Project drapeaupusin2

Start Date: April 1, 1996

WHAT RESEARCH IS BEING DONE?

In the boreal forest, the structure of landscapes has historically been under the influence of large-scale natural disturbances, especially fires. In the last forty years however, commercial timber management has become the prevalent perturbation in many parts of the boreal forest. Although forest management may show some similarities with natural disturbances (fire and insect outbreaks), to which biodiversity is adapted, there are important differences between these two types of disturbances. Timber management can considerably modify the structure and composition of boreal forest mosaics. The forest industry has yet to demonstrate that biodiversity can be maintained in managed forest landscapes both nation wide and within regions (Forest Management Certification). Indicators are required to assess whether or not the forest is within or approaching the desired target conditions at both planning (landscape) and forestry operations (stands) levels. Building up indicators involves (1) empirical investigations at both the stand and landscape scales (2) wildlife-habitat modeling efforts and (3) coupling results of these wildlife-habitat models to landscape scale forest dynamics models to determine the range of target conditions under which sustainable forest management may be defined. This project aims (1) to provide industry with a set of appropriate indicators to monitor biodiversity, and (2) to work with members of Legacies 1 and 2 as well as with industry partners to use the data in planning and scenario models for impacts of alternative harvesting techniques on biodiversity. Biodiversity monitors will be developed at two spatial scales: the forest management planning or landscape scale (coarse filter monitors),and the forestry operations level or stand-level scale (fine filter monitors). Forest songbirds are used as an indicator group to build on the preliminary understanding on how landscape patterns of the forest cover resulting from natural and anthropogenic dist

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Pierre Drapeau, **Jean-François Giroux**

Researchers

25. Wildlife Use Of Landscape Resulting From Different Management Strategies In The Boreal Black Spruce Forest.

Project bélangerlwild2

Start Date: April 1, 1996

WHAT RESEARCH IS BEING DONE?

The project is organized as a core LSBP project, which is done in a similar fashion across 3 regions (AB, NB and QC), with additional graduate student projects completing the core project. The goals are: (1) to understand the patterns and mechanisms of species responses to changes in stand and landscape structure by natural and anthropogenic disturbances; (2) to use this understanding to provide industry with a set of appropriate umbrella and indicator species and stand and landscape metrics to monitor biodiversity, an important element of adaptive management and ecological sustainability; and (3) to work with other SFM members of Legacy 1 and 2 as well as industry partners to use the data in planning and scenario models for impacts of alternative harvesting techniques on biodiversity. The intent is to develop biodiversity indicators at three operational and spatial scales: forestry operations level or stand-level scale; forest management planning or landscape scale; and cross-regional or continental scale. In eastern

Quebec, the study is conducted in a quadrat located between the Ashapmushuan Reserve and the lake St-Jean. Wildlife species investigated are passerines (NCE funds) and grouse, hare, and squirrels (co-workers with other funds).

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Louis Bélanger

Researchers
N. Bertrand, Marcel Darveau, Réjean Gagnon, F. Potvin

24. Natural Freeze Thaw Of Membrane Concentrates Derived From The Alkaline Extraction Stage Of Pulp Mills.

Project smithdnatu1

Start Date: March 25, 1996

WHAT RESEARCH IS BEING DONE?

Question: Can spray freezing process be applied for the treatment of pulp mill wastewater? Results to date: The experimental results revealed that the fractionation of impurities from the melting ice column was affected by the impurity concentration in the spray ice, the age of the ice (or storage time), the distribution of the impurities within the ice column and the ice column density. The initial 30% of the meltwater removed between 50% and 80% of the total impurities (indicated by TOC, COD, color and conductivity) in the ice columns. The experimental results obtained from this study have demonstrated that the spray freezing process can effectively remove organic, inorganic contaminants contained in the pulp mill wastewater. Management Considerations: Spray freezing process is a practical treatment alternative for the pulp mill wastewater which can be applied in the pulp mills located in the cold regions. Deliverables: 1. Ph.D. Thesis Titled: "Partial Freezing by Spraying as a Treatment Alternative of Selected Industrial Wastes" 2. Project report submitted to the SFM Network titled: "Treatment of Pulp Mill Effluent Using the Spray Freezing Process'.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Daniel Smith

Researchers
Stephen Stanley

23. Characterization Of The Viability Of Forest Dependent Communities In Québec.

Project bouthillierlchar1

Start Date: January 1, 1996

WHAT RESEARCH IS BEING DONE?

The main objective of this research is to explain the interface between forests and human communities. The researchers want to understand how forest-dependent communities adapt to

changes that stem from new forestry practices as well as from socio-economic fluctuations of public policy modifications. Their approach is based on the assumption that a community is a good setting in which to observe and manage environmental problems. They hypothesize that a forest-dependent community is a human ecosystem that is capable of carrying on in time if its institutions reflect the local environmental context and motivate the community to take control. Researchers will first define what sustainability means to forest community residents and then use data from three communities to identify issues at the community level. Data from interviews, opinion polls, and document surveys will be used to help understand the concept of capacity, and individual and collective adaptation mechanisms conducive to community sustainability. This data will constitute basic information that can be used at the community level to guide forestry practices. These data will be used to construct statistical inference models that link macroeconomic variables, local characteristics, and forest/health/status indicators in order to identify socio-economic sustainability indicators.

WHERE IS THE RESEARCH BEING DONE?
Quebec

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Luc Bouthillier

Researchers
Collette Ansseau, *Mario Carrier*, *Serge Cote*, *Jean Desy*, *Lynda Khalaf*

22. Comparative Impacts Of Natural (Wildfire) And Anthropogenic (Harvesting) Watershed Disturbances On The Zooplankton Communities In Boreal Lakes.

Project pinel-alloulbcomp1

Start Date: January 1, 1996

WHAT RESEARCH IS BEING DONE?

This research aims to understand how natural (wildfire) and human (clear-cut logging) watershed disturbances alter boreal lake ecosystems, and in particular the limnoplankton and zooplankton which are key components of lake food web integrity. The hypothesis that both wildfire and logging will increase zooplankton and limnoplankton biomass, and change zooplankton biodiversity has been tested for the first two years after perturbation. Zooplankton and limnoplankton biomass are promising tools to monitor the effects of watershed disturbances on lake biological productivity. A large scale comparative study will be conducted to assess short-term variation (3 yrs after perturbation) in zooplankton biodiversity and biomass, and the resilience of lake ecosystems. Further tests will determine if watershed disturbances affect food web interactions between zooplankton and bottom- up (nutrients. chlorophyll) and top-down factors (fish and invertebrate predators). Food web interactions are good indicators of the ecological integrity and functioning of boreal lakes. A small-scale study will focus on the most sensitive lakes (with drainage ratio >4) to give a better assessment of the impacts (5 yrs after perturbation) of watershed disturbances on zooplankton communities, both with comparative and experimental harvesting studies. The final goal is to produce simple bioindicators based on plankton communities that can be implemented in monitoring programs for sustainable forestry.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator

Bernadette Pinel-Alloul

Researchers

21. Comparative Studies Of CPRS (Cut With Protection Of Regeneration And Soils) And Natural Disturbance By Fire: Developing A Basis For Sustainable Practices In Black Spruce Ecosystems.

Project munsonacomp1

Start Date: January 1, 1996

WHAT RESEARCH IS BEING DONE?

The process of certification for forestry activities on a particular land base will require the demonstration that ecosystem functions and forest productivity are maintained or enhanced in the long term. The productivity of the forest depends in part on site resources (nutrients, water, and light) that are available for tree growth. The cool humid climate associated with the black spruce forests of Quebec contributes to accumulation of the surface organic humus of the soil, which may result in cooler soil temperatures and reduced availability of nutrients to trees. Fire is the natural disturbance in this forest, and the effect of fire is to periodically burn off a certain thickness of the surface humus, at the same time stimulating nutrient availability for some years after the fire. The method of harvest currently used in this forest protects the natural regeneration already established on the site, but does not disturb the forest soil. The major question is: if we do not reduce the depth of organic matter and stimulate nutrient availability using this practice, will seedling and advanced regeneration growth and development be hindered by a lack of - nutrient resources? To answer this question, this study evaluates soil fertility, seedling regeneration and long term tree-growth in both young (5 to 10 years old) and older ecosystems (> 50 years), on the oldest available harvested site in the region. This study also examines the potential impact of increased ericaceous vegetation on sites that are harvested. Data will contribute to modeling efforts of other SFMN projects. The common goal is to improve predictions of site productivity response to a wide range of natural disturbances and disturbances related to harvest and silvicultural activities. In order to accomplish this goal, currently available models based on nutrient dynamics are being adapted.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Alison Munson

Researchers
Pierre Bernier, *Réjean Gagnon*, *Gilles Robitaille*, *Jean-Claude Ruel*

20. Economic Issues In Assessing Sustainable Development In Forestry.

Project veemantecon1

Start Date: January 1, 1996

WHAT RESEARCH IS BEING DONE?

This project focuses on socio-economic analysis relating to defining and measuring sustainability, particularly the question of adjusting forest sector output and productivity to account for environmental impacts. Initial work on sustainability concentrated on assessing alternative economic and ecological paradigms for sustainability. More attention will now be

concentrated on sustainability indicators, natural resource accounting, natural and human capital assessment, and environmentally-adjusted productivity analysis for the boreal forest sector. In particular, initial work on "macro" sustainability indicators involving "green" accounting for the forest sector will be extended and refined, focussing on possible criteria for "strong" sustainability, and environmentally-adjusted productivity measurement, now completed for the pulp and paper sector, will be undertaken for the forest management and harvesting industries and the entire forest sector. Key questions include whether the boreal forest sector in Alberta and in Canada meets the criteria, following Pearce, of "weak" and "strong" sustainability and whether environmentally-adjusted productivity growth, properly measured, is higher than conventional estimates of productivity growth in the forest sector. Finally, attention will be centered on three policy areas which relate directly to sustainable forest management: employment and human capital development strategy, especially for aboriginals; resource evaluation over time (involving time preference); and tenure and regeneration policy improvements which would facilitate sustainability.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Terry Veeman

Researchers
Martin Luckert

19. Economic, Biodiversity And Carbon Uptake Tradeoffs In Forest Management: An Application Of Fuzzy Methods To Vague Concepts And Imprecise Data.

Project vankootengecon1

Start Date: January 1, 1996

WHAT RESEARCH IS BEING DONE?

The purpose of this study is to develop an integrated economic and ecological approach to sustainable forest management. We develop a methodology for conflict resolution between multiple objectives, including: 1) to increase discounted returns from commercial timber management; 2) to maintain stable employment in the forest sector; 3) to maximize carbon uptake; 4) to preserve biological diversity. The research in progress has three distinct stages. First, we study operational measures of biodiversity used in forest management. We then develop a mathematical model that incorporates the structural diversity of forests as an indicator of biodiversity. Then we examine tradeoffs among net present values, net carbon uptake, structural diversity, cumulative timber harvest and maintenance of an even timber flow. The next stage of the project will address vagueness of the biodiversity concept, stakeholders' preference uncertainty about components of biodiversity and imprecise data in forest management.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
G. Cornelis van Kooten

Researchers

18. Effect Of Landscape Structure On Dynamics Of Forest Tent Caterpillar Population.

Project rolandjeffe1

Start Date: January 1, 1996

WHAT RESEARCH IS BEING DONE?

Because one of the most important tools available for the management of boreal forests is the spatial arrangement and timing of forest stand treatments, such as cutting and planting, it is important to understand how the resulting spatial structure of the forests mimic natural disturbance and affect the normal ecological processes determining animal population size and distribution. This study examines the effect of large-scale structure of the boreal forest on the patterns of outbreak of the defoliating forest tent caterpillar in boreal forests. This is done because there is evidence that fragmented forests are associated with longer outbreaks of the tent caterpillar. The objectives of this project are to investigate (1) the effect of forest structure on the interaction between tent caterpillar and population processes including fecundity, dispersal, parasitism and disease, (2) The effect of forest structure on short-term dynamics of both low-density (increasing) and high-density (decreasing) caterpillar populations, and (3) the effect of forest structure on long-tent caterpillar outbreak dynamics based on tree-ring analysis, across a large area of boreal forest in northeastern Alberta.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Jens Roland

Researchers
Philip Taylor

17. Fire-Induced Changes In Lake Geochemistry: A Multi-Site Comparison Assessing The Role Of Catchment Fertility And Forest Composition.

Project prairieyfire1

Start Date: January 1, 1996

WHAT RESEARCH IS BEING DONE?

Forest fires affect not only the forest itself but also the lakes located within. The exact effects of forest fires on lake conditions remain difficult to predict or to extrapolate to other regions. This project will reconstruct the historical lake conditions and the occurence of fires from the diatoms and charcoal remains found in the sediments of lakes located in three regions (Abitibi, Reservoir Gouin area, and Northern Alberta). A paleolimnological approach to assess the fire-induced changes in lake chemistry has been established. This project focuses on 3 questions: 1) Does the natural fertility of the catchment affect the geochemical response of lakes to fires? 2) For a given region, is the geochemical response of lakes to forest fires significantly influenced by the forest composition? 3) For a given lake for which the catchment was logged and burned at different times in its recent history, is the geochemical response of the lake similar for the two types of perturbation? This integrative study of 3 regions will help define the nature, the extent and the generality of the effects of forest fires (and logging) on lake conditions.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Yves Prairie

Researchers

16. Impact Of Watershed Disturbance (Logging And Fire) On Fish Communities.

Project magnanpimpa1

Start Date: January 1, 1996

WHAT RESEARCH IS BEING DONE?

In Québec alone, the sport fishing represents an industry of $600 million in fishing services and $900 million in major purchases. Similar figures apply to most provinces of Canada. There is increasing evidence that deforestation, either through natural fire or logging, tends to increase the nutrients and organic carbon loading to lakes. These changes could affect the lake trophic interactions and fish populations. Preliminary results from 38 lakes of the Réservoir Gouin area showed that an important mortality of young yellow perch, white sucker and lake whitefish occur in the 2 years following a fire or a forest clearance. These mortalities could have a cascading effect on the most valuable, exploited species - Northern pike and walleye - which use perch, whitefish and sucker as forage fish. This project aims to describe and understand the impact of different levels of deforestation on fish communities to be able to predict changes in commercially important species following such perturbations. The specific objectives are to (1) determine if changes in abundance, growth and size structure of fish populations are correlated to changes in lake and watershed characteristics following fire or logging, (2) build simple empirical models to predict changes in fish populations following different levels of deforestation. These models will enable managers to predict these changes on the basis of lake and watershed characteristics, and thus propose cutting and fish exploitation regimes that will allow both forest harvesting and sustainable fisheries.

WHERE IS THE RESEARCH BEING DONE?
Quebec

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Pierre Magnan

Researchers

15. Impacts Of Fire And Harvesting On Water Quality In Lakes And On Nutrient Losses From The Boreal Forest Of Quebec.

Project carignanrimpa1

Start Date: January 1, 1996

WHAT RESEARCH IS BEING DONE?

The objectives of this project are 1) to quantify and explain the natural variability of water quality and mercury contamination in Shield lakes using empirical or semi-empirical models; 2) to develop explicit models describing the influences of forest harvesting, natural disturbances and time since disturbance on water quality and Hg contamination in biota; 3) to translate these

models into GIS-based tools that can identify lakes and watersheds that are particularly sensitive to watershed perturbations; and 4) to quantify the observed nutrient (nitrogen potassium, calcium) losses at the watershed scale in term of changes in soil productivity. Lake surveys and before/after impact experiments are used to measure and understand the responses of aquatic systems to natural disturbances and forestry practices. The studies are conducted on 38 headwater lakes (50-200 ha) of Haute-Mauricie (Reservoir Gouin) selected in collaboration with Kruger, Donohue and Cartons St-Laurent. Of these lakes, 19 lakes are used as reference (no perturbation in the watershed during the last 80-310 y), 10 have been logged in 1995 (15-95% of the watershed), and 9 have been impacted by medium to severe fires in 1995 (50-100% of the watershed). Since 1997-98, the watersheds of reference lakes have been experimentally harvested each year to provide before/after impact validations. Models will be developed to describe the effects of watershed disturbances (fire, logging) on water quality, mercury levels in game fish and nutrient losses from the forest. The models will be exportable to the geographic information systems used by the industry, will allow the identification of lakes particularly susceptible to harvesting, will provide basic information applicable to the continuing development of CSA and ISO certification guidelines for sustainable forestry, and will be integrated with other ongoing SFM research projects.

WHERE IS THE RESEARCH BEING DONE?
Quebec

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Richard Carignan

Researchers

14. Impacts Of Forest Management And Climate Change On Carbon Budgets Of Forest-Peatland-Lake Regional Ecosystems: Understanding The Processes.

Project vittdimpa1

Start Date: January 1, 1996

WHAT RESEARCH IS BEING DONE?

This study is targeted at developing a landscape level carbon storage decision support system. Databases of existing knowledge have been developed, and data deficiencies identified. These data deficiencies will be addressed and the resulting knowledge and understanding of forest-peatland dynamics will feed into the development of models. The main research questions are (1) How much carbon is presently stored in dead matter in each of the forest, lake peatland systems? (2) How much carbon is stored living matter in each system? (3) How is this carbon distributed on the Western Canadian land base? and (4) What are the dynamics of carbon transfers between these systems and how they are affected by natural disturbances? Knowledge deficiencies will be addressed through an integrated and highly targeted research program. The major deficiencies are in the area of acrotelm processes in peat, and impacts of disturbances on peatland carbon dynamics. This study will also develop an understanding of the forest management options that are presently available and the regulations and international agreements that may impact those options, in order to begin developing a Landscape Carbon Decision Support System (LCDSS) that may be used by forest managers. Without such a system, forest managers will not be able to properly evaluate the impact of their management decisions on landscape-level carbon storage; with the Kyoto protocol addressing carbon stores and fluxes in managed forests, and future

international protocols expected to be even more broadly applicable to landscape carbon, such a decision support system will soon be essential. This project aims to have such a system in place by the time it is needed.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Dale Vitt

Researchers
Ian Campbell

13. Impacts Of Natural Disturbance And Forest Harvesting On Water Quality, Primary Producers, And Invertebrate Communities In Lakes And Streams In The Boreal Plain.

Project prepaseimpa1

Start Date: January 1, 1996

WHAT RESEARCH IS BEING DONE?

This project is a large-scale field program focusing on the impacts of watershed disturbances (fire and forest harvesting) on lakes and streams in the boreal mixed-wood forest of Alberta. Fire is probably the prime factor dictating the high degree of spatial and temporal variability in boreal ecosystem structure and function in western Canada. The hypothesis is that surface waters in the Boreal Plain are influenced by both natural and human-derived disturbances occurring within their watersheds. The Alberta portion of the Land-Aquatic Interface program sampled 20 SFM core study lakes and shared data on 12 study lakes that were (i) perturbed by fire, (ii) perturbed by forest harvesting or (iii) reference lakes with no disturbance in their watersheds. Following the fires of 1998, sampling was carried out for five streams with burnt watersheds in the Virginia Hills north of Whitecourt, Alberta and 3 streams draining the Caribou Mountains (Peace River). This next field season will focus on a smaller core group of lakes and intensive study of streams in the Virginia Hills and Peace River burn areas. The primary objectives are to: 1) develop simple empirical models describing the influences of forest harvesting and fire on water quality and on primary producers (phytoplankton, periphyton and macrophytes) and invertebrate communities, as a prerequisite for developing strategies for sustainable forest management; 2) compare patterns of disturbance effects between Boreal Plain lakes of Alberta (which tend to be productive) with Boreal Shield lakes of Quebec (where lakes are less productive), and identify the underlying causal mechanisms behind the observed impacts; 3) work with Alberta Health and our industrial partners to determine human health impacts of forest fire and logging on aquatic systems, sediments, air and biota.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Ellie Prepas

Researchers
Ian Campbell, *Richard Carignan*, *Irena Creed*, *Bernadette Pinel-Alloul*, *Dolors Planas*, *Yves Prairie*, *Terry Prowse*, *William Tonn*, *Dale Vitt*

12. Impacts Of Watershed Disturbances On Phytoplankton And Periphyton Communities.

Project planasdimpa1

Start Date: January 1, 1996

WHAT RESEARCH IS BEING DONE?

This project contributes to the understanding of the effect of consequences of natural disturbances on primary producers of boreal forest lakes and the influence exerted by human activities in altering natural disturbance production patterns. Ongoing work will follow up on the identification of algae as early indicators of lake alteration and will test models derived from previous results. The general objective of this study is to determine the responses of algal productivity, biodiversity and algae's quality by comparing lakes in natural (fire) and in anthropogenic (harvesting) disturbed watersheds in boreal shield and plains forests. Specific objectives include: 1) the examination of persistence in algal responses in watersheds naturally and humanly disturbed and how these trends relate to changes in upper trophic levels; and 2) concurrently with algae production, other algal attributes will be studied, such as quality, community structure (size), and biodiversity. Quantitative models will be developed to relate the productivity, quality, biodiversity and structure of the communities at the base of the food web (algae) to natural vs. anthropogenic disturbances. In addition, data will be used to test whether water quality, acting on algae and their consumers, is the main force affecting the fish community (bottom-up effect) or if other variables such as habitat loss, changes in temperature or oxygen concentrations affect fish community structure directly (top-down effect).

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Dolors Planas

Researchers

11. Incentives For Pollution Control.

Project kennedypince1

Start Date: January 1, 1996

WHAT RESEARCH IS BEING DONE?

This program comprises the continuation of five projects currently funded by the SFM Network: Environmental Regulation and Technological Change (Project 1), Environmental Regulation under Technological Uncertainty (Project 2), Learning about Environmental Damage: Implications for Regulation (Project 3), Information and Willingness-to-Pay (Project 4), and Information as an Economic Instrument for Pollution Control (Project 5). Projects 1 - 3 examine the impact of environmental regulation on incentives for the adoption of pollution control technology. Project 1 provides the main theoretical framework for analysis and addresses some basic issues. Project 2 focuses on price-based regulatory instruments and examines the consequences of uncertainty with respect to technological change for the incentive effects of regulation. Project 3 focuses on the uncertainty on the other side of the cost-benefit problem: it examines the implications of future learning about environmental damage for the design of environmental regulation with respect to pollution control technology adoption. Project 4 addresses the question of how the costs of environmental damage should be measured. In particular, it asks the question: "how much information should individuals be given about an

environmental amenity for the purposes of eliciting from them the value they place on that amenity?". Project 5 examines the policy role for the dissemination of information about the environmental profiles of produced commodities in creating incentives for the adoption of cleaner technologies in the production of those commodities. Examples of this kind of information dissemination are "certification" and "eco-labeling" schemes.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Peter Kennedy

Researchers

10. Physiological Responses Of Mixedwood Species Picea Glauca And Populus Tremuloides To Cold Soils.

Project lieffersvphys1

Start Date: January 1, 1996

WHAT RESEARCH IS BEING DONE?

This project has shed new light on our understanding of water relations in forest trees and their regulation by root temperature. This study addresses the hypothesis that symplastic water transport in roots is more predominant is aspen than that in white spruce and that root hydraulic resistance in white spruce is affected more by the properties of cell walls and their resistance to hydraulic flow. The principal objective is to determine the mechanisms of regulation of water channel activity in aspen and examine root water transport under low temperatures in white spruce. The results of this study to date clearly demonstrate high sensitivity of aspen to low soil temperature due to the inhibition of root hydraulic conductivity. The combined reduction in soil temperature with high transpirational demand due to relatively high air temperatures in spring may be an important factor contributing to aspen decline observed in many stands in the boreal forest. The ongoing studies focus on the mechanisms of regulation of root hydraulic conductivity in aspen. The results indicate that root hydraulic conductivity is regulated by water channel proteins, recently discovered in the cell membranes of all living organisms. The regulation of water channel activity by temperature is the subject of the final phase of the project.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Victor Lieffers

Researchers
Janusz Zwiazek

9. Reconstruction Of Recent And Holocene Fire Chronologies And Associated Changes In Forest Composition: A Basis For Forest Landscape Management.

Project bergeronyreco1

Start Date: January 1, 1996

WHAT RESEARCH IS BEING DONE?

The appropriateness of the natural disturbance hypothesis for sustainable forestry depends in

part, on whether fires can account for a substantial fraction of the variability in the observed forest composition. The link between forest composition and fire can be examined using the reconstruction of fire regimes and forest composition throughout the Holocene. This study will use fire chronologies derived from stratigraphic analysis of charcoal obtained from lakes with annually laminated sediments and from recent reconstruction of fire regime using dendrochronology and GIS approaches. Change in vegetation composition for different fire regimes will be reconstructed using both pollen and macrofossil analysis of cores sampled in lakes with annually laminated sediments and current patterns of vegetation composition. In addition, a landscape model predicting fire spread and fire composition under different fire regimes will be developed. This model will be used to reconstruct the natural forest composition of different landscapes submitted to different disturbance regimes. The reconstructions could serve as guidelines for the maintenance or the restoration of forest mosaics under forest management.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Yves Bergeron

Researchers
Mike Flannigan, *Sylvie Gauthier*, *Pierre Richard*

8. Reducing Long Term Effects Of Forest Harvesting On Indicator Species Of Closed Canopy Mature Forests.

Project villardmredu1

Start Date: January 1, 1996

WHAT RESEARCH IS BEING DONE?

The objectives of this study are to: (1) determine the relative influence of stand level and landscape-scale forest characteristics on bird species presence and abundance; (2) measure effects of harvesting intensity on bird reproductive success at the stand and landscape scales; and (3) identify and study species particularly sensitive to current harvesting practices. Certain species may be sensitive to stand-level characteristics (e.g. shrub density, availability of snags) whereas others would respond both to local conditions and landscape-scale effects. Baseline data allowed the identification of two species particularly sensitive to current harvesting practices: the Ovenbird and the Pileated Woodpecker. Both species were rare in selection cuts and Ovenbirds present in treated stands had a low reproductive output. These species will be further examined to assess their ability to persist in intensively-managed forest landscapes in NW New Brunswick and in northern Alberta. In Alberta, the relative ease of birds to move across a harvested forest landscape, a burned landscape, and an unbroken forest will be compared. Finally, the bird surveys will be used to compare avian community integrity among forest landscapes from NB, QC and AB. If the Ovenbird and Pileated Woodpecker indeed represent indicators of closed-canopy forests and mature forests, respectively, they will be used to monitor local and large-scale effects of forestry operations. The research on reproductive success will also be used to simulate and assess the effects of different harvest plans for a given forest area.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator

Marc-André Villard

Researchers

7. Spatial-Temporal Dynamics Of The Spruce Budworm Epidemic In The Northeastern Boreal Forest.

Project morinhspat1

Start Date: January 1, 1996

WHAT RESEARCH IS BEING DONE?
The objectives of this study are: 1) to establish spatio-temporal dynamics of spruce budworm outbreaks for the last two centuries in north-eastern boreal forests; 2) to determine the northern boreal forests; 2) to determine the northern limit of the spruce budworm 3) to evaluate the impact of spruce budworm outbreaks on the radial growth of balsam fir and black spruce; and 4) to determine the history of spruce budworm outbreaks for recent and Holocene periods.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Hubert Morin

Researchers
Réjean Gagnon

6. Sustainability For Whom? Social Indicators For Forest Dependant Communities In Canada.

Project beckleytsust1

Start Date: January 1, 1996

WHAT RESEARCH IS BEING DONE?

This study involves two related and yet distinct lines. The first involves the use of census data to analyze selected social indicators. This analytical work will compare communities that have been designated as more than 50% dependent upon forest industries, those that are less dependent (less than 50%), and rural communities that do not depend on forest industries. A subset of forest dependent communities will be explored using time series data. The second component of the study will be comprised of eight detailed case studies of forest dependent communities from

which the researcher will derive additional social indicators. This investigation will pay particular attention to the lives of women and older community residents, ethnic or racial minorities. The total set of case studies will include communities that are dependent upon forests for subsistence and for tourism/recreation, as well as more traditional timber-dependent communities and diversified forest-dependent communities.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Tom Beckley

Researchers

5. Sustaining Aboriginal Communities In The Boreal Forest: Exploring Alternatives.

Project dickersonmsust1

Start Date: January 1, 1996

WHAT RESEARCH IS BEING DONE?

This project builds on 5 years of previous research on community sustainability, with a specific focus on First Nations / Aboriginal communities and Traditional Land Use and Occupancy Studies. This year we will: 1. Further analyze some of the barriers to the sustainable use and enjoyment by Aboriginal Peoples of those forest lands which are also their homelands, and 2. Develop alternative models of economic development and forest institutions that empower Aboriginal communities. The two following questions will be investigated: 1. What has been the impact of three Traditional Land Use and Occupancy Studies (TLUOS), conducted to document traditional and current uses of the forest in northern Alberta, on the Aboriginal communities and individuals involved in those studies? 2. What are the key features of a forest tenure system which enable Aboriginal world views, values and laws to be an integral part of the use and management of forest resources? These questions incorporate a new focus on the creation of employment, capacity-building, and economic development that is consistent with the goals and values of Aboriginal communities.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Michael Robinson, **Mark Dickerson**

Researchers
Monique Ross

4. The Economics Of Certification.

Project vertinskyithee1

Start Date: January 1, 1996

WHAT RESEARCH IS BEING DONE?

Despite the critical importance of environmental certification to the sector, there are only very few studies of the economics of certification. The objective of this research is to close this gap. Thus far, researchers have focused on economic theoretical analysis of product certification and

have collected information about 90% of all firms in the U.S. that have obtained FSC certification. Subsequent analysis of this data provided important information about expectations and motives of firms that pursued FSC certification, costs and changes in practices brought about by certification, and realized benefits. Researchers are also investigating the political economy of certification, focusing particularly on the politics of market access, the development of SFM promoting institutions, and the role of governments. Another area of study involves a survey of Canadian companies in the forest products sector to investigate the determinants of firms' propensity to obtain environmental certifications of various kinds (ISO 14000, CSA, FSC). This study relates corporate attributes, and attitudes and perceptions about the impacts of certification, to decisions to certify (or the intention to obtain certification). A final area of work will involve a series of in-depth multiple case studies that will identify the actual change that can be attributed to certification processes of various kinds and their economic consequences. Researchers will compare changes in forestry practices of companies which have made commitment to different types of certification processes and those who have not, and how disturbance paradigms can be incorporated into principles and standards for certification.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Ilan Vertinsky

Researchers

3. The LSBP Project: Developing Landscape And Stand Level Biodiversity Indicators.

Project hannonsthel1

Start Date: January 1, 1996

WHAT RESEARCH IS BEING DONE?

The objectives of this project are to: (1) discover relationships between forest composition and structure at the stand and landscape levels and the presence and abundance of forest birds; (2) determine whether patterns found in birds are consistent across disturbance types (recently logged or burned, undisturbed within AB) and regions and forest types (comparisons with QC and NB); (3) determine whether patterns found in birds (which are easily surveyed) are consistent with patterns in other groups such as small mammals (which may be harder to survey); (4) determine habitat relationships of birds are various scales (nest tree, home range, surrounding landscape); (5) determine umbrella and indicator species and landscape metrics for use by industry in monitoring biodiversity; and (6) work with members of Legacies 1 and 2 as well as industry partners to use the data in planning and scenario models for impacts of alternative harvesting techniques on biodiversity. Core data will be used to determine a set of species that respond primarily to stand structure and another that respond primarily to landscape structure, that are representative (i.e., have the same response patterns) of a suite of other species, and that are easy to monitor. Larger scale analyses will determine landscape metrics to be used in monitoring, for example threshold levels of forest cover, levels of land use intensity and amount of forest edge. The chosen indicators will then be used in harvesting scenario models developed by Legacy 2 to determine impacts of alternative harvesting plans on biodiversity.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Susan Hannon

Researchers

2. Understanding How Fire Behaviour Characteristics Shape Tree Population Dynamics And Forest Patterns.

Project johnsoneunde1

Start Date: January 1, 1996

WHAT RESEARCH IS BEING DONE?

This project is concerned with understanding the principal processes, both man and natural, which influence forest dynamics at both the local (hillslope) scale and landscape (basin) scale. The objectives are: (1) to study biophysical land classification and geomorphic process, (2) to determine the relative importance of logging, fire and terrain on plant diversity, (3) to understand how the forest age mosaic is created based on very high quality and high-resolution data, (4) to study the pattern of duff removal by fire and the main factors responsible (a smoldering combustion model is being created to predict these forest-type-specific burn patterns by using a heat budget and easily measured field variables), (5) to estimate recruitment and mortality for two of the principal tree species over their life span, (6) to study regeneration dispersal into burns and survival in the first few years after fire when most recruitment occurs; work is continuing for permanent plots and the sorting out of seedbed conditions that result in regeneration success or failure, and (7) to develop a forest fragmentation process model that can generate fragmentation due to decision rules for settlement or forestry and the structure of the landscape as defined in the geomorphic process-biophysical land classification.

WHERE IS THE RESEARCH BEING DONE?

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Ed Johnson

Researchers
David Greene, *Kiyoko Miyanishi*

1. Assessing The Economic Impacts Of A Natural Disturbance Forest Management Regime.

Project adamowiczvasse1

Start Date: April 1, 1995

WHAT RESEARCH IS BEING DONE?

In order to fully assess the implications of moving to a natural disturbance approach to forest management, the social and economic implications of such changes must be assessed. More specifically, given definitions of disturbance based management, the implications for timber values (including direct financial and indirect employment and regional impacts) and non-timber values (including recreational or use values as well as passive use values) need to be assessed. In this project, researchers will build the tools needed to examine timber and non-timber implications of moving to a disturbance based management approach at a forest level (as versus a stand or landscape level). Researchers will work with industry partners to define the difference

between disturbance based management and traditional management in terms of differences in allowable cut, harvesting location and frequency. Three levels of analysis will be employed to examine the impacts of such changes. The financial implications (timber values) will be examined using spatial-temporal harvest scheduling models. The regional economic impacts will be examined using new developments in Social Accounting Matrix and Computable General Equilibrium modeling. The non-timber impacts will be assessed using spatial-temporal models of recreation values. The third level of the project is the development of socio-economic monitoring tools to assess disturbance-based management over time. This will involve experimenting with the use of natural resource accounting at an industry level as a monitoring tool.

WHERE IS THE RESEARCH BEING DONE?
Alberta

WHO IS INVOLVED WITH THE PROJECT?

Principal Investigator
Vic Adamowicz

Researchers
Jim Beck, *Grant Hauer*, *Martin Luckert*, *Fiona Schmiegelow*