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Pacific Forestry Centre
Victoria, British Columbia

Alternatives to Clearcutting

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Natural Resources Canada
Canadian Forest Service

Ressources naturelles Canada
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Canada

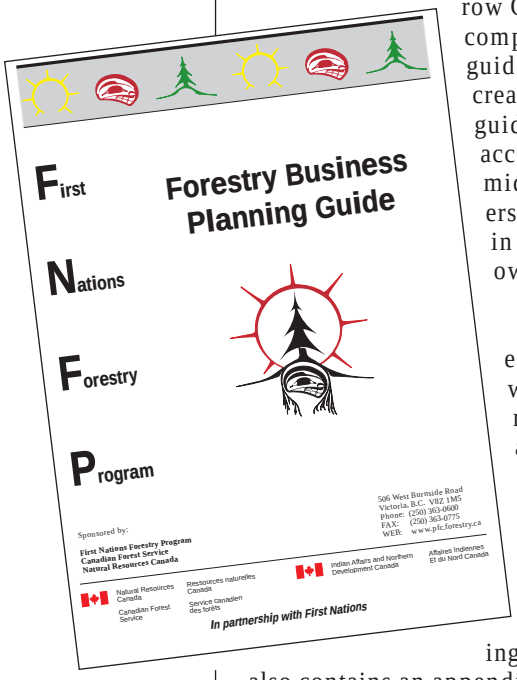
The First Nations Forestry Program Forestry Business Planning Guide

"First Nations interested in running forestry businesses have a new tool at their disposal."

Since the announcement of the First Nations Forestry Program (FNFP) in April 1996, hundreds of a First Nations have taken advantage of the program's resources to undergo training, develop joint ventures with forest companies, and start up or expand their own forestry-based businesses.

And now aboriginal Canadians interested in running forestry businesses have a new tool at their disposal - the FNFP Forestry Business Planning Guide.

The guide, along with its companion booklet, the Forestry Business Resources Directory, is designed to assist First Nations entrepreneurs in the planning and implementation phase of new or expanding forestry-related businesses.



Barbara Hager, of Aarrow Communications, who compiled and wrote the guide, says her goal was to create a step-by-step guide that was useful and accessible to small and mid-sized business owners and those interested in establishing their own businesses.

The guide is divided into four chapters which provide information on topics such as identifying a product or service for your company to market, establishing your own company, writing a business plan, and seeking financing for your company. It also contains an appendix with a comprehensive list of business information available from organizations, corporations, government agencies and on the Internet.

Hager says she compiled the guide using existing business development guidelines created by provincial and federal government departments and by organizations such as the Business Development Bank of Canada. She also asked small-business owners what information would have been helpful when they started out and found many sites on the Internet that provide information on developing businesses.

Because the guide is targeted to a First Nations audience, Hager, who is an aboriginal entrepreneur herself, used her own experiences and made an effort to include information that is particularly relevant to aboriginal entrepreneurs.

"Even though business is universal, aboriginal business owners have specific needs and interests, so I tried to address those issues," she says. "The guide definitely has a First Nations perspective to it."

Jerry Perry, of the Ma-Mouk Development Corporation in Port Alberni, B.C., says the guide is an excellent resource for aboriginal people interested in creating a forestry-based business.

"The business information is good, the guide is easy to understand for people with a variety of education levels and it does a good job of covering the steps necessary to go from having an idea to developing a business plan," he says. "The specific information on forestry-based business is excellent as well. The guide connects what one needs to know about forestry and business development in one place, in a way that makes it easy to follow and use."

The First Nations Forestry Program is jointly funded by the Canadian Forest Service and the Department of Indian Affairs and Northern Development. It was established in 1996 to enhance economic opportunities for First Nations both on and off reserves. Details are in the December 1996 issue of Information Forestry.

The First Nations Forestry Program Forestry Business Planning Guide is available from the Pacific Forestry Centre at (250) 363-0771 or it can be downloaded from the FNFP website: http://www.pfc.cfc.NRCan.gc.ca/main/programs/fnfp/fnfp.htm

Climate Change – How Will it Affect our Forests?

"No change occurs in one area without creating changes in other parts of the forest."

"Don't knock the weather; nine-tenths of the people couldn't start a conversation if it didn't change once in awhile." Kin Hubbard, writer, 1925.

Climate change is not a new concept; the weather is synonymous with change. What is new (at least in this century) is the rate at which climate is changing and the effect rapid change will have on our environment. The Canadian Forest Service Climate Change Network is studying climate change and its influence on the forest.

"Pollen core analysis has determined that during the last ice age there were very rapid changes in climate over a 50 to 60 year period, so it is not improbable that it is happening again," says Ross Benton, forest climatologist working at the Pacific Forestry Centre.

"Impacts of climate change on Canada's forests may include changes in growth and ranges of existing tree species, changes in ecosystem functioning, and changes in disturbance regimes related to fire, insects, and diseases."

The Canadian Forest Service is researching the effects of climate change on our forests.

In western Canada, large areas of aspen decline have been observed. Repeated defoliation by the forest tent caterpillar, coupled with drought and late-winter thaws followed by spring frost were contributing factors to the observed die-back of aspen. "I think it is still too early to conclude that the observed forest decline is being caused by climate change," says Dr. Ted Hogg, research scientist at the Northern Forestry Centre in Edmonton. "But I would say that the observed changes in aspen forests following the warm, dry years since 1980 are similar to what we would expect in the future based on the predicted climate change for this region."

One of the areas that has experienced considerable climate change is the Canadian North, where El Niño has created a 10 degree increase in temperature (in the Yukon). Using forest modeling dynamics, the Climate Change Network has been part of an interagency, multisector Mackenzie Basin Impact Study looking at the potential impacts of global warming on Canada's northern forests.

"We are studying the potential changes to the forest from now until 2050; how climate change will affect the biology of the vegetation, which will undoubtedly change," says Benton. "One important discovery is that there may not be so much a shift in the species itself but in the composition of species existing in the North. There may be more coniferous species which would be good for economic reasons, but a longer fire season could develop in the territories, which is a major form of change for vegetation. As well, increased temperatures will provide sufficient growing season heat to allow the spruce weevil to expand its range northward in latitude and upward in elevation to occupy the white spruce in the Mackenzie Basin. That could have a huge impact on the area."

Besides the devastating effects climate change could have on the North, an increase in temperature could mean an increase in vegetation. However, as Benton explains, the weather may be warmer but the growing season is still limited by the rotation of the earth; the length of daylight hours affects vegetation. "There is also a lack of soil development on the Canadian Shield which will restrict vegetation growth. And how will accelerated rates of permafrost thawing influence vegetation?"

As in any complex ecosystem, no change occurs in one area without creating changes in other parts of the forest. Understanding, predicting and assessing these changes is critical to the sustainable management of our forests.

Natural Resources Canada was involved with the Mackenzie Basin Impact Study headed by Indian and Northern Affairs Canada, in partnership with the Government of the Northwest Territories Department of Renewable Resources, Alberta Environmental Protection, Aurora Institute, Canadian Global Change Program of the Royal Society of Canada, Canadian Polar Commission and Esso Resources Limited. Additional support was provided by numerous other government departments, agencies and universities.

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A Herculean Herbarium Task Completed

"The herbarium is invaluable in confirming published host-fungus distribution records and for reexamining specimens in the context of new taxonomic information and research techniques."

A room full of tree disease fungi may sound like a forester's nightmare, but to a mycologist a room full of fungi is a dream. To mycologist Dr. Brenda Callan, it's a dream based on reality.

Callan is curator of the Pacific Forestry Centre's Forest Pathology Herbarium, an internationally recognized collection of over 35,300 preserved and catalogued forest fungi and disease specimens. Representing over 3000 different fungal species in BC, the collection is the largest of its kind in western Canada.

"This herbarium is known as DAVFP in the Index Herbariorum, the catalogue of the world's herbaria," says Callan, who works in the Biodiversity Network of the Canadian Forest Service. "That stands for the Department of Agriculture, Victoria, Forest Pathology. Although it obviously switched departments a few times, the herbarium collection has been preserved and expanded since its establishment in 1940."

Pholiota destruens fruiting on the cut end of a cottonwood

Although the herbarium itself is almost 60 years old, some of the mycology and forest pathology specimens date back to the 1800s. Such a collection is a tangible record of the natural history of BC.

"As well, there are over 140 type specimens; collections which are the basis for new species descriptions," explains Callan, dwarfed by the herbarium's tall green cabinets of fungi samples. "The herbarium is invaluable to researchers in confirming published host-fungus distribution records and for reexamining specimens in the context of new taxonomic information and research techniques. It provides the physical evidence that a fungus species is present in the province."

Most of the DAVFP specimens were collected by Canadian Forest Service forest rangers and research scientists over the years. The Pacific Forestry Centre continues to maintain, expand, and modernize the collection. Part of the modernization has resulted in the development of a new herbarium website available at **http:/www.pfc.cfs.NRCan.gc.ca/biodiversity/herbarium**.

On the website you will find the DAVFP Collections Database, listing over 20,000 of the specimens stored in the herbarium. The database can be searched by fungus, host, determiner, collector, locality, DAVFP number, or year of collection. A map of a single collection location, or a distribution map of all locations on record can be created with the click of the mouse.

Another section of the website gives you access to the BC Host/Fungus Index Database. It has been designed to assist in the identification and formal documentation of fungi occurring on native plants in BC [except for most agricultural crops and horticultural or ornamental (non-native) plant species]. The Host-Fungus Database was compiled from 60 years of Canadian Forest Service records as well as published literature and data generously provided by Agriculture/Agrifood Canada. This section can be searched by genus or specific epithet of both host plants and fungi, and also includes a smaller list of fungi associated with other substrates including non-plant hosts.

There is also a section at the website called "Forest Mushrooms", an electronic brochure providing colour illustrations and simple explanations of the various ecological roles that common mushrooms play in our forests.

Questions pertaining to forest pathology or forest fungi from the Victoria area can be directed to the herbarium at (250) 363-0684, or mailed to:

Curator, DAVFP
Forest Pathology Herbarium
Pacific Forestry Centre
506 West Burnside Rd
Victoria, BC V8Z 1M5

Inquiries regarding disease identification within BC but outside the Victoria area should be directed to the regional pathologist, BC Ministry of Forests. They will provide disease collection slips and a referral.

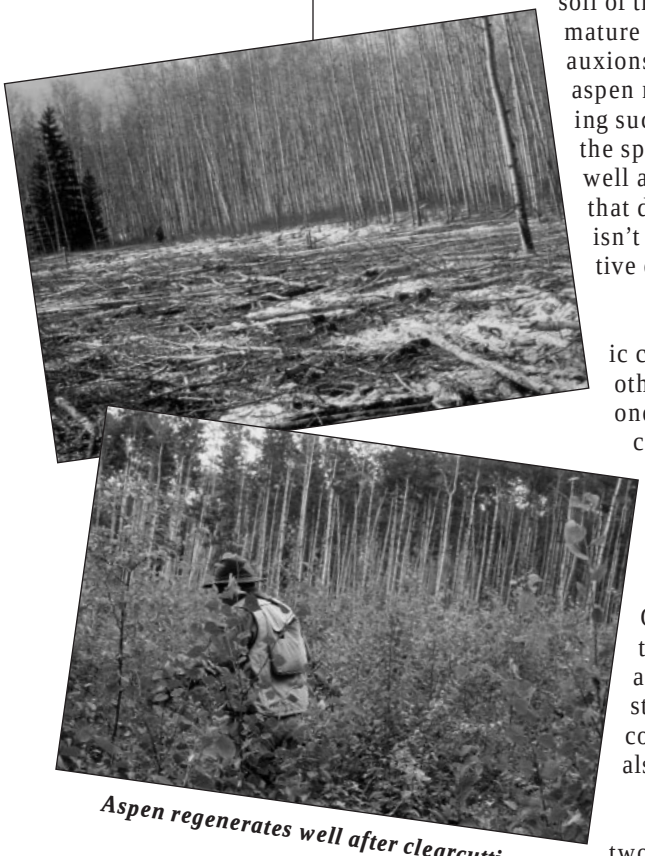
Dr. Brenda Callan can be reached at bcallan@pfc.cfs.NRCan.ca

Studying Alternative Silvicultural Methods

"Once considered a weed tree by industry standards, new technology has increased the commercial value of aspen over the last decade."

To some, "forestry in Saskatchewan" may seem like an oxymoron, yet half of the province's 651,900 km^2 consists of forests. That's a large area. And a lot of trees. Many of those trees are aspen, a species that regenerates if clearcut. So why has the Canadian Forest Service been looking at other means of harvesting in Saskatchewan?

"Once considered a weed tree by industry standards, new technology has increased the commercial value of aspen over the last decade," explains Dr. Doug Maynard, research scientist at the Pacific Forestry Centre. "And clearcutting appears to be the most appropriate way to harvest the species for a number of reasons. Aspen needs a specific soil temperature for it to sucker that is only achievable in open areas rather than the cool soil of the forest. Secondly, mature aspen produces auxions which prevent aspen roots from producing suckers. But although the species regenerates well after clearcutting, that doesn't mean there isn't a role for alternative cutting."



Aspen regenerates well after clearcutting

"Besides economic concerns, there are other considerations one has to make in choosing a silvicultural method," adds Dan MacIsaac, forestry officer at the Northern Forestry Centre in Edmonton. "Things like aesthetics, water storage, and wildlife considerations are also important."

That's why these two researchers, part of the Canadian Forest Service Effects of Forestry Practices Network, studied the effects of alternative silvicultural methods in Meadow Lake Provincial Park in northwestern Saskatchewan. This boreal forest is primarily made of deteriorating mature (65-75 years old) aspen that has been exposed to natural stresses such as drought and tent caterpillar infestations. The Saskatchewan government wanted to harvest the area to ensure its safety to users of the park as well as to rejuvenate the forest so new trees would continue to grow. At the same time, they wanted to preserve the beauty of the trees.

"Because most of the literature suggests clearcutting is not only the best harvesting method economically, but also beneficial to rejuvenating the forest of this particular species, we began patch clearcutting in 1992," explains Maynard. "Rather than one large continuous clearcut (clearcuts of about 20 hectares are normal for efficient harvesting), we had smaller clearcut openings of one hectare, surrounded by one hectare of undisturbed forest. Our question was whether we could get adequate regeneration with such small openings with minimal damage to the ecosystem."

This study, now completed, indicates that patch clearcutting in the Meadow Lake area *does* allow for successful regeneration of aspen. "Three years after harvest, the stand was fully stocked to aspen with around 43 000 stems per hectare. We also found that patch clearcutting has a minimal effect on plant diversity and on soil nutrients," says MacIsaac. "Any effects we did determine were very short-term, occurring in the first two to three years following harvest, but by year three or four, the forest was back to preharvest conditions."

"We concluded that the use of patch cutting in an integrate resource plan could potentially minimize ecological disturbance while providing adequate regeneration for aspen," adds Maynard. "But it's important to note that these results are site-specific and because aspen grows over a wide range of environmental conditions, it is difficult to generalize about potential impacts of aspen harvesting on nutrient losses in other aspen forest ecosystems."

This study was funded in part by the Canada-Saskatchewan Partnership Agreement in Forestry as well as the Canadian Forest Service.

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Alternatives to Clearcutting – Ea

"Although a long-term study, MASS has yielded interesting results so far."

You could say it's a MASSive partnership; the Montane Alternative Silvicultural Systems project, also known as MASS, is a multi-agency cooperative testing new approaches to harvesting and regeneration in mid-to-high elevation old-growth forests of Vancouver Island, B.C. Although a long-term study, MASS has yielded interesting results so far.

"Basically, the MASS project, located near Campbell River, B.C., is a study of four silvicultural treatments and their comparison to an unharvested, old-growth area," explains CFS senior research scientist Jim Arnott working in the Effects of Forest Practices Network at the Pacific Forestry Centre. "Future timber harvesting will depend heavily on montane forests, creating a need to better understand these ecosystems. The predominantly old-growth montane to subalpine forests (over 700 m elevation) where MASS is located contain a significant part of the coastal timber harvest."

MacMillan Bloedel Ltd. is the principal industrial partner in this multi-agency cooperative. "Our company is involved with both the operational and research aspects of MASS," says Bill Beese, forest ecologist at MacMillan Bloedel. "Union crews from our Menzies Bay division successfully completed the first old-growth shelterwood in coastal B.C. Crew involvement in the planing and layout and on-site supervision was essential."

Shelterwood (retaining 30% of the basal area of the original stand - approximately 200 stems per hectare) is one of the alternative silvicultural treatments at the MASS site, each with three 9-hectare replicates. The other treatments include: Patch Cut (harvesting a 1.5-hectare patch at a time, with the adjacent patch remaining until regeneration reaches ten metres in height); and Green Tree Retention (reserving at least 25 trees per hectare). These systems are compared to each other and to a 69-hectare Clearcut (cutting all trees) as well as a 20-hectare old-growth reserve.

"So far," says Arnott, "we have determined that Patch Cut and Green Tree silvicultural systems can be implemented successfully in old-growth forests under the conditions tested at the MASS site. We also found that the Shelterwood system, the most desirable silvicultural method for its aesthetic value where 30% of trees are retained, can also be implemented successfully in this area. We found that when residual trees were left in clumps in the Shelterwood system, productivity was maintained with minimal damage to stems. But this silvicultural method is 49% more expensive than the Clearcut."

"However, cumulative losses to windthrow after five years have been relatively high in the Green Tree and Shelterwood systems," adds Beese, "almost half from a single storm in October 1996."

Besides being a study in the operational costs and feasibility of alternative silvicultural methods, there are 21 integrated long-term, multi-disciplinary research studies underway at the MASS site. The following is a brief summary of various researchers' results to date.

Site and Stand Characterization

Soils - Research at the MASS site indicates moderately well to imperfectly drained podzols with a relatively thick humus layer. It is evident that windthrow has played a major part in soil development.

Forest Stand - "Western redcedar and yellow-cedar are the oldest trees found on the MASS site (up to 800 years), western hemlock ranges from 200 to 800 years, and amabilis fir were generally less than 250 years of age," says Beese. "The number of snags (standing dead trees) per hectare is 80 and research is being carried out on the amount of coarse woody debris by decay class. It's been found that trees in the Green Tree Retention area have been more vulnerable to windthrow, but the Shelterwood area has lost the greatest number of stems due to higher retention densities."

Snow Hydrology - Results from winter surveys indicate that average snow depths are lowest within the Old-Growth, moderate within the Shelterwood, and highest in the Clearcut areas.

Forest Health - Dwarf mistletoe on western hemlock overstorey was reduced by harvest from 18% in the Old-Growth area to an average of 6% in the Shelterwood and 3% in the Green Tree Retention areas. *Phellinus pini* and

rly Results of a Long-term Study

Echinodontium tinctorium was present in residual western hemlock and amabilis fir. After six months of harvesting, wood boring insects were not recovered from trees, but 18 months after harvesting the insects were recovered from windthrown western hemlock and amabilis fir.

Forest Birds - Twenty-six bird species were recorded in a pre-harvest study of breeding bird communities. Post-harvest winter surveys showed that Old Growth and Patch Cut reserve blocks contain twice as many birds as the Shelterwood area and four times as many as the Green Tree Retention treatment.

Canopy Insect Diversity - Early findings from a branch sampling program include the discovery of active populations of the balsam woolly adelgid in old-growth amabilis fir and a new species of gall midge attacking newly flushed growth. Significant populations of hemlock woolly adelgid in old-growth western hemlock have also been found.

Ecological Processes and Regeneration

Climate Stations - Climate stations monitor a wide variety of climatic variables in each of the treatment sites. "Both Clearcut and Shelterwood treatments tend to be generally cooler than Patch Cut or Green Tree treatments, but for different reasons. The Clearcut is likely cooler due to more wind associated with a longer fetch and the Shelterwood is cooler due to a shading effect from the remaining overstorey. Both Green Tree Retention and Patch Cuts tend to be protected by trees in adjacent treatments or leavestrips. This tends to trap heat and increase the daily temperature averages," explains Arnott.

Litter Decomposition, Leaching and Nutrient Cycling - For the first two years after harvesting, weight loss of needle litter was fastest in the Old Growth. Forest floor material lost about 10% of its initial weight during the two years in all silvicultural systems. Results indicate that alternative silviculture systems affect N mineralization less than clearcutting, and that N mineralization and nitrification increases after clearcutting were not a result of quicker decomposition of the organic matter. Changes in carbon supply rather than alterations in the microclimate may be related to high rates of N mineralization and leaching in the Clearcut areas.

Soil Disturbances - This study looks at the impact of alternative silvicultural systems on forest soils, the effectiveness of skid-trail rehabilitation and the cumulative effects on long-term forest productivity. Results to date indicate that the best seedling growth and survival of western hemlock and amabilis fir has occurred on the undisturbed sites in the Clearcut, Patch Cut, and Green Tree Retention treatments. Dispersed site disturbance after harvesting was generally equal between different harvested treatments.

Vegetation Communities - "In this study, the composition, structure and abundance of the understorey vegetation community, including natural and advanced conifer regeneration, is being monitored," says Beese. "The Shelterwood has retained the greatest amount of cover among the harvested treatments. Seedfall results indicate that western hemlock is much more abundant than amabilis fir or western redcedar seeds, while yellow-cedar seed is quite rare on the treatment blocks. Total seedfall was proportional to the amount of forest canopy left after harvesting."

Regeneration - "This study has been established to determine what factors, subject to management intervention, limit growth in amabilis fir and western hemlock seedlings," says Arnott. "After three growing seasons the greatest seedling growth response to light, nutrition, and vegetation competition has been to the addition of N. It is clear that nutrition has a far more limiting effect on early seedling growth among all harvesting treatments than any associated changes in microclimate or the influence of vegetative competition."

Seedling Stress and Competition

Responses of Regenerating Montane Conifers to Stand Edge Microclimates - Seedling responses to environmental gradients were studied along a transect running from the Old-Growth into the Clearcut. So far, research indicates that height and diameter growth in

story continued on page 12

Comments on an International Forum

"The technology in forestry has pushed beyond the traditional information-gathering methods."

Think of forest inventorying and computers and you may think of aerial photos and display of interpretations in Geographic Information Systems. But technology in forestry has pushed beyond the traditional information-gathering methods. In February of this year, the Canadian Forest Service, Pacific Forestry Centre, in partnership with MacMillan Bloedel Ltd. and the BC Ministry of Forests, hosted an international forum, "Automated Interpretation of High Spatial Resolution Digital Imagery for Forestry" to discuss this expansion in technology.

"Basically, it was a forum of papers and discussion sessions focused on computer-assisted methods of forest interpretation and parameter extraction from high resolution digital imagery," explains Dr. Don Leckie, research scientist in the Canadian Forest Service Landscape Management Network and coordinator of the workshop. "It was a great opportunity to discuss techniques and applications; a chance to discuss concerns with other technology developers and practitioners."

Forum field trip to a logging site

Besides technology developers, participants included scientists, forestry practitioners, and forest managers from across the globe. Discussions revolved around forestry requirements, current capabilities, and future activities.

"This workshop made me realize it may be possible to work together at an international level to tackle the many problems we have to get this technology up and going," says Robert Preston of State of Forests of New South Wales, Australia. "There is every reason why this may become a reality."

"We design and build airborne remote sensing instruments and provide information products based on those instruments," says Cliff Anger, president of ITRES Research Limited in Calgary, Alberta. "We've been working in forestry for the last couple of years and now we're seeing serious operational use being made of the technology and of a technique that we've developed, so from the perspective of our company it was an excellent conference."

"We just started a new research project about tree encroachment onto grasslands of BC using remote sensing and GIS," says Dr. Yuguang Bai, range ecologist with Agriculture and Agri-Food Canada at the Kamloops Range Research Ranch. "While the focus of this forum was forestry, the technology can also be applied to grasslands. The forum brought experts from many countries together and it was truly an international conference."

Jim Poriz of Environmental Insight in Blairmore, Alberta had a similar view of the conference, but a different view on the technology. "The forum was interesting and it was great to see the advances that have been made in the interpretation of high spatial resolution digital imagery." But he feels that a stereoscope and 1:15,000 photos in the hands of a good interpreter is difficult to replace. "I have no doubt that computer technology will eventually be able to automate the existing interpretation process. Unfortunately we still have a fair distance to travel down that path."

Dave Hill, forest landscape analyst at the Pacific Forestry Centre and a coordinator of the forum, agrees with Poriz, "Although promising, much still has to be done before this technology will be as readily acceptable and as easy to use as aerial photography. Aerial photography has been around for over 75 years while true digital image processing of high resolution data for forestry is in its infancy, with most developments being less than five years old."

"This forum confirmed that although we've come very far in a very short time, we have a way to go yet," adds Leckie. "But it also confirmed that automated interpretation of high spatial resolution digital data for forestry is alive, well, and growing."

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The Canadian Forest Service Supports Forestry Students: A Student Perspective

"One of the best tools is AI reasoning. It allows you to incorporate rules into your systems and methods."

Automating the process of monitoring indicators to measure the health of Canada's forests is the research focus of National Scientific and Engineering Research Council (NSERC) scholarship recipient Nigel Daley working at the Pacific Forestry Centre.

"For a country the size of Canada, computing these indicators on a national level every five years using a manual system isn't feasible," explains Daley, who is in the first year of a Computer Science Masters program at the University of Victoria. "What we are doing is applying artificial intelligence (AI) to remote sensing data from aircraft and satellites, so we can compute indicators in an automated way."

For his thesis, Daley will concentrate on developing intelligent systems to monitor three or four of the 83 indicators of sustainability identified by the Canadian Council of Forest Ministers.

"I'm currently working on a fragmentation indicator, looking at the level of fragmentation and connectedness of forest ecosystems," says Daley. Fragmentation - the breaking up of ecosystems into smaller parcels - usually results from logging or forest fires, which create clearings visible from aircraft and satellites.

"The amount of fragmentation within a forest ecosystem is a tricky measure to define and calculate since it can mean so many different things - changes in the forest canopy, disruptions of animal habitat, and so on," says Daley, adding that it is not yet clear how fragmentation affects the sustainable growth of forests and ecosystems. "More fragmentation benefits some species over others."

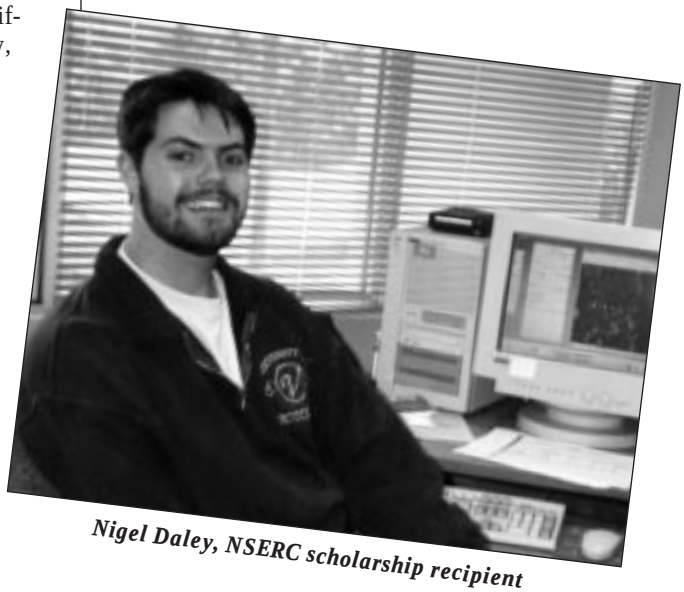
Daley uses high spatial resolution imagery - imagery in which each picture element, or pixel, represents approximately 10 square metres or less on the ground - to look at forest canopy fragmentation. One of the issues he is concerned with is determining the relationship between canopy fragmentation and fragmentation of other ecosystem components, including animal habitat. "Forest canopy fragmentation can be measured from remote sensing since it is visible from above," he says. "This data will then have to be combined with habitat and other data to give an integrated overall measure of what is going on."

"One of the best tools is AI reasoning. It allows you to incorporate rules into your systems and methods," says Daley. "Given a problem, a rule-based or expert system can apply previously gained knowledge."

Daley receives financial support through the Canadian Forest Service (CFS) Graduate Supplements Program, which promotes graduate research in forestry in Canada by providing $5,000 supplements to students with NSERC post-graduate scholarships who are studying forestry or a forestry-related field.

He has also been given the opportunity to work at the CFS Pacific Forestry Centre with chief research scientist Dr. David Goodenough, who is Daley's supervisor.

"Working at the CFS gives me a unique opportunity to work with scientists in the field. It also gives me access to excellent computing facilities and data sets," adds Daley, who says the assistance he receives from NSERC and the CFS has enabled him to continue his studies. "The scholarship made graduate work possible for me and the supplement has given me more freedom to publish papers, attend conferences, and make connections while working on my thesis."



Nigel Daley, NSERC scholarship recipient

10th Anniversary Program Planned for South Moresby Replacement Forest

"SMFRA is one component of the South Moresby Agreement, designed to protect our heritage while sewing the seeds of economic diversification and community stability."

In July of 1987, National Park and Marine Park Reserves were created on the southern part of Moresby Island, Queen Charlotte Islands/Haida Gwaii. This area is commonly referred to as Gwaii Haanas, or Place of Wonder. Creating Gwaii Haanas required the removal of almost 34,000 hectares of commercially valuable forest from the Island's timber production land base. In order to offset the loss of revenue from timber production and decreased employment in the forest sector, the federal and provincial governments each contributed $12 million to the South Moresby Forest Replacement Account (SMFRA). Under the terms of the South Moresby Agreement (SMA), this Account will expire on March 31, 2000. A retrospective program is currently being planned for this year on Haida Gwaii. Plans include celebrating a decade of achievements with other beneficiaries of the SMA and presentation of leading edge forestry research funded by the SMFRA.

Gwaii Haanas, Place of Wonder, South Moresby Island

SMFRA's intent is to restore and maintain employment in the forest sector, at least until the full economic benefits of the park are realized. Over the next two years it will continue to deliver projects in the following program areas: operational forestry enhancement, research and demonstration, inventory and communication. The Account is intended to supplement, rather than replace, ongoing forestry programs.

Throughout its existence, the operational forestry enhancement program has generated the most forest sector employment. Activities such as juvenile spacing, pruning, and fertilization, along with accompanying prescriptions and monitoring, have provided approximately 160 person years of employment since 1987. Over 80% of the projects are awarded to local contractors.

In addition, significant effort is put into pest management. Research and operational trials are required to assess pest implications and improve control techniques. Introduced species and the feeding impact of Sitka backtailed deer on redcedar seedlings is a serious concern. Redcedar is the keystone species in Haida traditional and cultural use, as well as the most difficult tree to regenerate on the Islands due to deer browse. Other pest management concerns are the future impacts of forest defoliating insects such as the blackheaded budworm and the Sitka spruce leader weevil.

Under the advice of an advisory committee, co-chaired by the Canadian Forest Service and the BC Ministry of Forests, SMFRA provides funding for research and inventory projects within three broad areas: ecosystem productivity enhancement, integrated resource management, and inventory. Some of the work funded in whole or in part by SMFRA includes:

- inventory of red and blue listed plant species;
- population dynamics of Queen Charlotte Island ermine, a rare species that is considered endangered;
- patterns of western redcedar regeneration and experimental deer removal;
- digitized mapping of cultural inventories; and,
- the book, *Ecology and Management of Sitka Spruce Emphasizing its Natural Range in British Columbia*, UBC Press 1997.

SMFRA's projects are carried out in partnership with licensees, scientists, non-governmental organizations and local contractors, with involvement from the Island's community. Benefits from this work are felt not only at a community level, but also provincially, nationally and globally.

"Over time, the SMFRA has evolved and become more reflective of local needs and values. Its focus has changed from 'volume replacement' to 'resource sustainability' and from 'maximizing employment' to 'community stability'." says Bronwen Beedle, provincial co-chair of SMFRA. "The new directions are demonstrated in part by the addition of transi-

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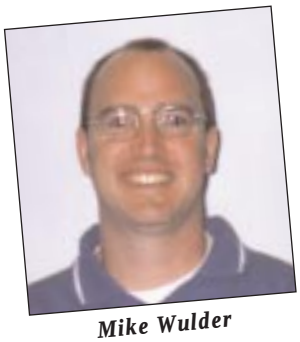
Staff Comings and Goings

Welcome to **Mike Wulder**. As a research scientist, Mike uses digital image processing, spatial statistics, algorithm development, remote sensing, and geographical systems to develop new methods and applications for the extraction of forest inventory parameters for the National Forest Inventory.

Howard Plato joins the Pacific Forestry Centre as Chief of Informatics, responsible for the operation and management of the centre's computing centre and the internal and external networks.



Mike Wulder

Howard Plato

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tional funding for community involvement in strategic land use planning." The new employment opportunities generated by community empowerment in resource planning and management is indicative of the economic diversification that is occurring today on the Queen Charlotte Islands/Haida Gwaii.

"The 10th Anniversary Program provides a focus for all those benefiting from SMFRA investments to share their experience and determine a vision for the future," says Elaine Teske, federal co-chair of SMFRA, "We look forward to Queen Charlotte Island residents helping us celebrate a decade of successful programming."

For more information about SMFRA please contact Greg Wiggins, Program Coordinator at (250) 559-6200, or by e-mail at Greg.Wiggins@gems3.gov.bc.ca

Recent Publications

Un longicorne originaire d'Asie.
Humphreys, N.; Allen, E.; Humble, L. Centre de foresterie du Pacifique, Victoria, CB. (1998). Avis Concernant un Ravageur Forestier Exotique Numéro 1.

Carie associée aux blessures d'exploitation chez le mélèze de l'Ouest (*Larix occidentalis*) et le pin tordu latifolié (*pinus contorta*).
Allen, E.; White, T. Notes de Transfert Technologique. Numéro 7. Service canadien des forêts, Centre de foresterie du Pacifique. (1998).

The Bridge
Maides, R. (Editor). First Nations Forestry Program. Natural Resources Canada, Canadian Forest Service/Indian and Northern Affairs Canada. Pacific Forestry Centre, Victoria BC. (1998).

Montane alternative silvicultural systems (MASS). A research and operations partnership (brochure).
Arnott, J.T.; Beese, W.J.; Mitchell, A.K.; Peterson, J. (eds). Canadian Forest Service, Pacific Forestry Centre, Victoria, BC. (1998).

The Canadian Intersite Decomposition Experiment (CIDET): project and site establishment report.
Trofymow, J.A. and CIDET Working Group. Canadian Forest Service, Pacific Forestry Centre, Victoria, BC. Information Report BC-X-378. (1998).

Upcoming Events

Long-term Silvicultural Research Sites Workshop: Promoting the Concept – Protecting the Investment
October 25 - 28, 1998
Victoria, BC

This workshop will address data management, project planning and design, funding, promotion of interdisciplinary research, networking, and technology transfer and extension. The three themes of the workshop are: Long-term silvicultural research sites; Planning for the long term; and Getting the goods out.

Contact:
Tina Kerr, Workshop Coordinator
Canadian Forest Service
Pacific Forestry Centre
506 West Burnside Road
Victoria, BC V8Z 1M5
Phone: 250-363-0616
Fax: 250-363-0775
Email: ckerr@pfc.cfs.NRCan.gc.ca
Information and registration forms are also available at http://www.pfc.cfs.NRCan.gc.ca/workshops/ltrs.htm.

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both clearcut and edge plots were similar, suggesting that release response of the seedlings was similar despite differences in hours of direct sunlight, air temperature and evaporative demand.

Growth Limitations of Regenerating Montane Conifers Under Alternative Silvicultural Systems - There is little evidence of exposure damage in natural and planted seedlings in the MASS site. Photosynthesis rates were similar among all silvicultural systems (except for a small difference in Shelterwood) and no significant differences were found between species or among planted and natural regeneration. Photosynthesis was not reduced by soil water deficits nor was there appreciable soil water deficit or tree water stress in any of the silvicultural systems.

Studies are also ongoing in the areas of: Growth and Yield; Genetic Consequences; Soil N -Cycling and Microbial Dynamics; Seed and Seedling Diseases; Indicators of Competitive Stress in Coastal Montane Conifers; Growth of Advance Natural Regeneration; and Responses of Advance Amabilis Fir to Light, Nitrogen and Vaccinium Release.

These are very early results from long-term investigations. Many of the studies will be monitored for at least 20 years to provide more definitive answers on the implications of alternative silvicultural systems on montane ecosystems in coastal British Columbia.

This research and operations partnership between industry, universities and provincial and federal governments has been held up as a model of new forestry practices regionally, nationally and internationally. Besides the Canadian Forest Service and MacMillan Bloedel Limited, partners include the Forest Engineering Research Institute of Canada (FERIC), the University of British Columbia, the University of Victoria, and the B.C. Ministry of Forests. More information on MASS is available at http://www.pfc.cfs.NRCan.gc.ca/practices/mass

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