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**hitchhiking
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(See story on page 6)



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New Futures for CFS

Natural Resources Canada

Jean C. McCloskey, Deputy Minister of Natural Resources Canada recently announced Treasury Board's approval of the department's new organizational structure.

The reorganization completes the process begun in the federal government's Program Review and results in a renewed mandate to focus on science and policy for the sustainable development and use of Canada's natural resources.

Effective August 16, 1995, Natural Resources Canada will consist of four science-based sectors: Canadian Forest Service; Earth Sciences; Energy; and Minerals & Metals.

Earth Sciences brings together the Geological Survey of Canada and Geomatics Canada. Minerals and Metals combines the department's mineral policy functions with CANMET's minerals, metals and mining laboratories and related science activity, including the Explosives Branch. CANMET's energy laboratories and related science activity and energy policy and programs will form the new Energy Sector.

The three new sectors are modelled on the example of the Canadian Forest Service.

New Futures for CFS

Although the organization of the Canadian Forest Service provided the model for the reorganization of the department, we are nonetheless affected by fiscal restraint and downsizing of government.

At present, we are in a transitional state: enacting recommendations that require trimming our staff and expenditures, and streamlining our science and technology activities. Throughout this process, we shall continue to provide essential forestry research of benefit to all Canadians and, in particular, the Forest Sector.

Impacts of Downsizing

In the downsizing trend caused by the deficit-reduction measures of the current federal budget, the CFS regional research centre for Newfoundland and Labrador will close; a small satellite "node" in Cornerbrook will report to the Maritime Forestry Centre in Fredericton. In Ontario, the Petawawa National Forestry Institute will close completely and the Forest Pest Management Institute in Sault Ste. Marie will merge with the Great Lakes Forestry Centre. All district offices will also close.

In this region, that means the closure of our Prince George office which is scheduled for 1997. Over the next three years, CFS staff at the Pacific Forestry Centre will be reduced to approximately 130 from the present complement of 185.

The reduction in human and budgetary resources means that some research programs and services will be discontinued, some will be cut back and others will be consolidated. But some strengthening will take place as a number of scientific staff relocate from closing establishments. The recommendations of the CFS working group on Program Review will guide decisions in these areas.

Program Review

In November of 1994, as part of the federal government's Program Review, the CFS formed a Working Group to examine and develop recommendations on future organization and priorities for its Science and Technology activities.

The recommendations of the Working Group are now being incorporated into a new Science and Technology Program structure for the CFS.

While the process is not yet complete, and outline of our activities has been established.

The new program structure features two main themes:

- A. Understanding Forest Ecosystems and,
- B. Strategies for Advancing Sustainable Development.

Within each theme various 'networks' have been identified.

Understanding Forest Ecosystems

- Biomonitoring
- Climate Change
- Biodiversity
- Forest Ecosystem Processes
- Impacts of Forestry Practices

Strategies for Advancing Sustainable Development

- Plant Biotechnology
- Socio-Economic Research
- Fire Management
- Landscape Management
- Pest Management

Specific centres will be designated the "Lead Centre" for various components of the research program. The Pacific Forestry Centre has been named the lead centre for the Impacts of Forestry Practices and Landscape Management networks. The Landscape Management network includes Remote Sensing and Pest Management Decision Support Systems.

Watch for more information on the new face of the Canadian Forest Service in the December issue of Information Forestry.

*"We shall
continue to
provide essential
forestry research."*

INFORMATION FORESTRY

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The management team

Dr. Carl Winget Regional Director General

We are pleased to introduce you to Dr. Carl Winget, the new Director General of the Canadian Forest Service in the Pacific and Yukon Region.

Dr. Winget is a long-time member of the Canadian Forest Service. He began his career with the CFS in 1964 as a research scientist at the Laurentian Forestry Centre. In 1967 he departed to serve as Associate Professor of Tree Physiology at Laval University. He returned to the Laurentian Forestry Centre in 1973 as Manager of the Forest Resources Research Program and, in 1978, was appointed Director General for the Quebec Region. In 1982, Dr. Winget moved to Ottawa to accept the position of Director General of the Forest Science Directorate at CFS headquarters. Since 1988, he was Director General, Ontario Region, at the Great Lakes Forestry Centre in Sault Ste. Marie.

Dr. Winget received his B.Sc. in forestry from the University of New Brunswick and his M.Sc. and Ph.D. from the University of Wisconsin. His specialties are forest ecology and tree physiology.

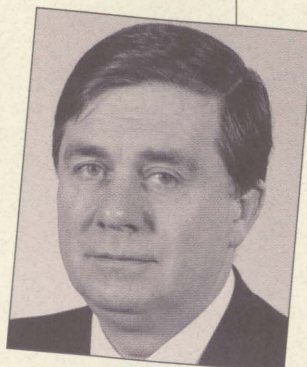
Dr. Winget looks forward to meeting his new colleagues and clients of the Canadian Forest Service in this region over the next few months.

Research Directors

We are also pleased to introduce you to the Pacific Forestry Centre's two new Directors of Research, Dr. Paul Addison and Dr. Murray Strome.

Dr. Paul Addison

Dr. Paul Addison also joins us from the Ontario Region, where he has been Director, Forest Resources and Environment Division since 1989. During this time he also provided line management of the regional research programs and was national manager of the Forestry Practices Green Plan initiative.



Dr. Carl Winget

Dr. Addison joined the CFS as a Research Scientist at the Northern Forest Research Centre in Edmonton where he studied the effects of air pollution on forest systems in both boreal and mountain systems. He moved to Ottawa as Coordinator of the Acid Rain Program in 1984 and, from 1985 to 1989, as Environmental Coordinator for Forestry Canada.

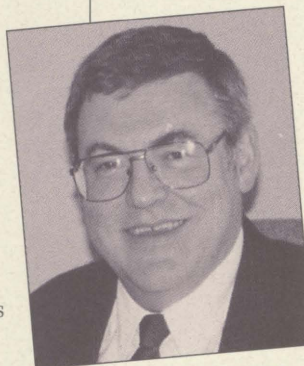
Dr. Addison has a B.Sc. and M.Sc. in Biology from the Laurentian University in Sudbury, Ontario, and a Ph.D. in Ecology from the University of Alberta in Edmonton, Alberta.

Dr. W. Murray Strome

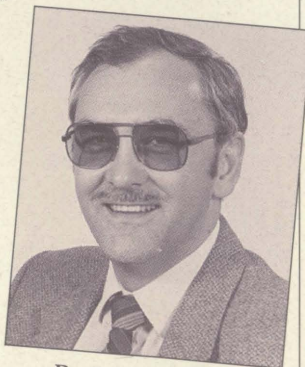
Dr. Strome graduated from the University of Alberta with a B.Sc. in Engineering physics, obtained a M.A.Sc. in Engineering Physics from U.B.C. and earned his Ph.D. in Electrical Engineering from Carnegie Mellon.

He joined the National Research Council 1962 where he developed airborne digital data acquisition and magnetometer systems. From 1970 to 1972 he worked as a consultant for his own firm, during which time he designed and directed the implementation of the Canadian system for processing LANDSAT remote

sensing data. From 1972 until 1984, Dr. Strome held senior positions with the Canada Centre for Remote Sensing, including Chief of the Data Processing Division, Chief of the Applications Division and Director of the Digital Methods Division. In 1984, Dr. Strome became president of PCI Inc., a company which develops and supplies digital image analysis systems and methodologies. In 1987 he became Chairman of the Board, a position he retains today.



Dr. W. Murray Strome



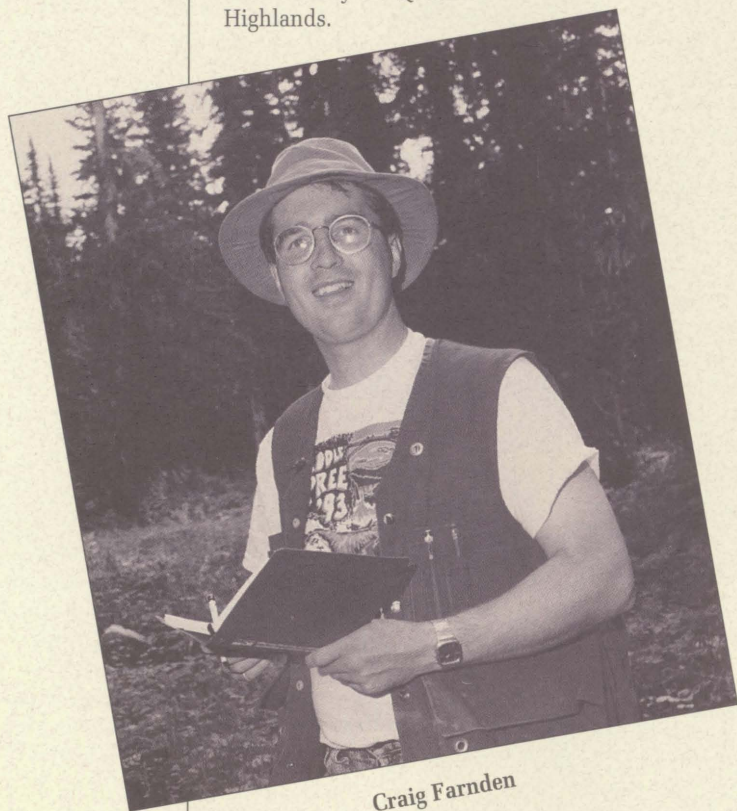
Dr. Paul Addison

Report bridges regeneration gap

“The key is to be aware of the environment when making a prescription.”

For a seedling planted in an area described as “severe” and “harsh,” prospects for survival aren’t good. For the silviculturalist trying to create a successful regeneration plan for that seedling, inadequate information on environmental and site conditions can render the task next to impossible.

The area in question is the Engelmann Spruce-Subalpine Fir (ESSF) biogeoclimatic zone, which includes most of the high-elevation forests within the interior of B.C. In north-central British Columbia, ESSF zones are associated with the Hazelton, Skeena, Omineca, Rocky and Columbia Mountain Ranges, as well as some higher-elevation portions of the Interior Plateau, most notably the Quesnel Highlands.



Craig Farnden

As the name implies, the ESSF zone is dominated by stands of Engelmann spruce and subalpine fir. The trees survive in a continental climate characterized by long, cold, snowy winters and short, cool summers. The snow-free period, particularly at higher elevations and on north aspects, can be as little as 110 days. Terrain is rugged, with steep-sided U-shaped valleys and jagged peaks.

As a mountainous region, the ESSF zone presents a challenge because climate and thermal regimes can vary dramatically. Local varia-

tions in site conditions are also caused by slope and slope position, elevation, aspect, soil characteristics and vegetation cover. Environmental factors affecting seedling survival include soil and air temperature, frost, vegetative contributions to snow press and soil stability on steep slopes.

Until the mid-1980s, logging in subalpine stands in the Prince George, Prince Rupert and Cariboo Forest Regions was sporadic, and no clear reforestation trends were established. As forestry operations moved into subalpine regions, reforestation became more difficult and often failed because site conditions differed from those at lower elevations. Although research on the ESSF zone had been carried out, there was no readily accessible summary for practicing silviculturalists.

Craig Farnden, forester and silviculturalist for the Canadian Forest Service in Prince George, had worked as a consultant for six years at the time. “When I was preparing preharvest prescriptions for subalpine forest areas there was so much information that I needed, but didn’t have,” said Farnden. The missing data, such as air and soil temperatures, impacts of competing vegetation and snow at high elevations, were necessary to answer the question “What are the critical factors I should consider?”

To fill this information gap, Farnden reviewed the available literature on subalpine silvicultural practice and augmented it with observations made during field tours of the high-elevation operations of 16 licensees within the Prince George, Prince Rupert and Cariboo Forest Regions in the summer of 1992. His compilation is published as “Forest Regeneration in the ESSF Zone of North-Central British Columbia”. The report highlights the current knowledge of environmental conditions in this region, their effects on tree survival and growth, some of the forest practices that can modify adverse conditions, and the silvical characteristics of affected tree species.

Each of these environmental conditions interacts with the others and affects the selection of cutting and reforestation methods. “The key is to be aware of the environment when making a prescription,” said Farnden. “By doing so, when you treat for one environmental factor you can ensure you won’t be creating an adverse effect on another.”

By identifying the environmental conditions in subalpine forests and the changes in those conditions when forests are harvested, practicing silviculturalists will help minimize problems with regeneration. More information on forest regeneration in the ESSF zone of north-central British Columbia can be found in Information Report BC-X-351 available from the Pacific Forestry Centre.

Native fungus clears the way for B.C. Hydro

“Several factors make the biological control environmentally sustainable.”

B.C. Hydro may enlist the help of some very tiny workers to keep the electricity flowing in British Columbia. Thanks to a partnership with the University of Victoria and the Canadian Forest Service, the provincial hydro-electric provider is conducting a trial using native fungi to keep its powerline right-of-ways clear of obstructing trees on test sites in the Duncan and Harrison Hot Springs areas.

Dr. Simon Shamoun of the Canadian Forest Service and Dr. William Hintz of the University of Victoria are leading the collaborative B.C. Hydro trial. Shamoun and Hintz specialize in the use of biological agents, like fungi, to control unwanted plants. Their groundbreaking studies are helping to develop environmentally-friendly forest weed control methods that could revolutionize the way we manage our forested lands and power corridors.

To keep British Columbia energized, B.C. Hydro must maintain more than 69,000 km of right-of-ways, the cleared routes of land that follow beside and beneath powerlines. Gwen Shrimpton, a

Senior Environmental Coordinator with the hydro-electric server, explains that tall, bushy trees like red alder and bigleaf maple can become problems because they rapidly take over cleared areas. “The branches can come into contact with lines and interrupt electrical service or, worse yet, create an electrical hazard,” she says. “B.C. Hydro spends about \$28 million each year just to keep these, and other aggressive plants, in check.”

Shrimpton adds that manual cutting is not always a viable option. “Manual control is not only expensive, but impractical since every time you cut one stem, more new shoots grow in its place.” For this reason, B.C. Hydro has used a chemical herbicide to maintain the powerline corridors and to keep shrubs out of overhead lines in areas of high weed growth.

B.C. Hydro recognizes that there is increasing public concern over chemical products. The company is researching feasible and more environmentally sustainable solutions to its vegetation management problems. Hintz and Shamoun aim to fill this gap.

In a study co-funded by B.C. Hydro’s Research and Development sector and the Natural

Sciences and Engineering Research Council of Canada (NSERC), the researchers are using a fungus called *Chondrostereum purpureum* as an alternative to chemicals.

Discovered by CFS researcher Dr. Ron Wall, *Chondrostereum* has been tested extensively and has proved promising in other forestry applications. Researchers hope that it will be equally as effective in the right-of-ways. Hintz and Shamoun began their trials with the fungus last summer, testing it on red alder near Duncan and on bigleaf maple near Harrison Hot Springs. “This spring we will head back to the sites and begin to compare the effects on the target trees,” says Shamoun.

Hintz explains that several factors make the biological control environmentally sustainable. “To use this control we must first make a small wound in the stem of each plant and then apply the fungus to that wound. This plant by plant application means that we can be very discrete about where the fungus is placed and means that the method is also safe to use near stream areas because there is no seepage.”

Other criteria also ensure the method’s environmental safety. The researchers carefully use only the strains of fungi that are native to a particular location and which affect only the target plant species. Since the fungi are native to each particular ecosystem, they can be safely reabsorbed when the biocontrol work is done.

Explains Shamoun, “When a fungus is applied, it moves through the plant’s cell walls and prevents new shoots from sprouting. When there are no more cell walls to live off, the fungus and its dying host become fuel for other living organisms in that area.”

In conjunction with the field trials, Hintz and Shamoun are working on several related projects. They are collecting relatives to *Chondrostereum purpureum* from around the world to study its “family tree” and population characteristics, and they are also assessing the unique genetic structures in the strains that they hold.

Both researchers are extremely pleased with the project so far. Says Hintz, “This study shows that universities, federal centres and industrial partners can work together to develop innovative solutions.”

“And ultimately,” adds Shamoun, “if all goes well, we will have developed an environmentally-friendly, non-chemical product that is safe and publicly acceptable and which can effectively be used by our clients, B.C. Hydro and the B.C. Ministry of Forests.

Dr. Simon Shamoun

Causing a stir overseas

CFS research fights European embargos

“Both
govern-
ments
are concerned
about our forests
and environment...”

For the past few years, a tiny parasitic worm has unknowingly put a kink in Canada's wood export industry. While harmless in Canada and much of the U.S., the pinewood nematode (PWN) causes pine wilt disease in warmer climates and has resulted in major timber losses in Japan and parts of China and Korea.

The PWN led a quiet life in Canadian pine trees until Finnish authorities found it in imported coniferous wood chips. Aware that Japan loses more than one million cubic metres of timber each year to the nematode, Finland banned all non-kiln-dried softwood from countries where the PWN occurs. In 1986, other Scandinavian countries followed suit. The ban affects \$3 billion in Canadian exports.

In response to the embargo, Canadian Forest Service (CFS) scientists and the Forest Insect and Disease Survey (FIDS) undertook a number of studies on the PWN. Thanks to their efforts, the Plant Health committee of the European Union met in October, 1994 and, after reviewing Canada's scientific evidence, agreed to undertake a detailed risk assessment. The studies focussed on the presence or absence of the parasite in Canada, the effect of the PWN on European trees, the identification of host tree species and the biology of the beetle that transmits the nematode.

While CFS researchers found that European species such as Scots pine and lodgepole pine were susceptible, the PWN doesn't pose a problem for Canadian trees. “The summers are too cool in Canada and our trees are too resistant,” says CFS Research Scientist Dr. Jack Sutherland, “and while we do have the pathogen, other factors such as insects, fire and drought must weaken the trees to allow them to become infected.”

The PWN is transmitted in two ways. In both cases, the parasite moves from tree to tree on longhorn (cerambycid) beetles; in highly affected areas one adult beetle can carry 15,000 nematodes. With primary transmission, the beetle flies to healthy pine trees where it feeds and

matures. The nematodes jump ship and enter the feeding wound. In areas with high temperatures and non-resistant tree species, such as Japan, there is a high PWN buildup, and the tree exhibits pine wilt disease and dies.

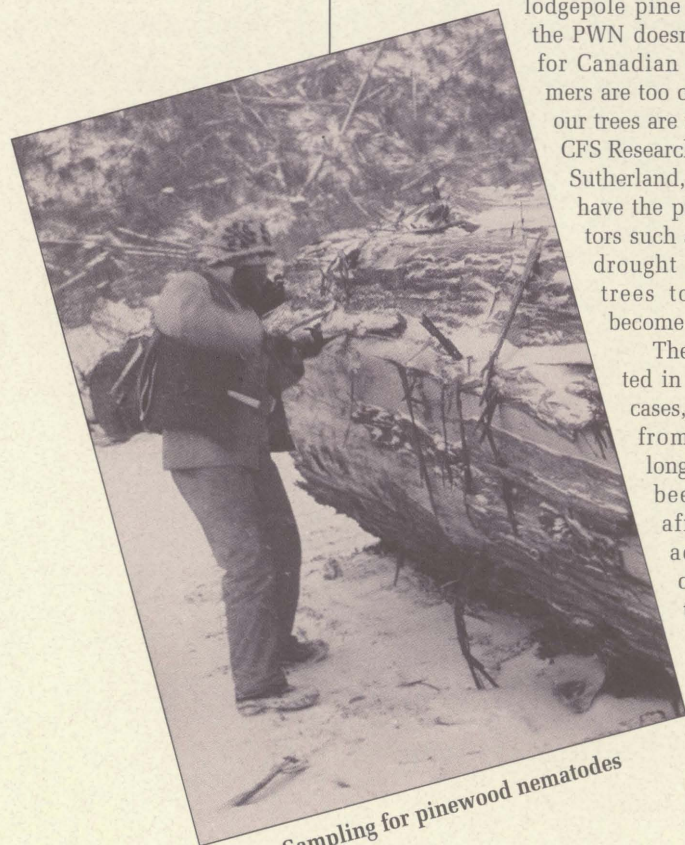
Secondary transmission, which is the norm in North America, occurs when the beetle lays its eggs in dead or dying trees. The PWNs leave the insect, enter the dying tree, and feed on fungi. The nematodes, however, are a secondary pathogen because the tree was already stressed or dead when the beetles arrived.

In cooperation with the CFS, the Council of Forest Industries (COFI) and Forintek initiated a two-year study to investigate control of the nematode and its carrier, the longhorn beetle, by heat treatment. Heat treatment is less expensive and less time consuming than kiln drying and is equally effective in killing nematodes. Several Canadian forest industries now use this method, allowing them to continue exporting.

Inoculation experiments by Dr. Sutherland and co-workers showed that while many Canadian tree species are susceptible to the PWN, both western hemlock and western redcedar are resistant. Surveys by FIDS rangers showed the longhorn beetle doesn't visit western redcedar, and this tree species is therefore PWN-free and does not require heat treatment. Surveys also showed the beetle infrequently visits western hemlock, so the CFS set out “to present the European community with strong enough scientific evidence that western hemlock or other “non-host” trees could be exempted as well,” said Dr. Van Sickle, head of FIDS.

Using bait log trials, in which freshly cut logs from healthy standing hemlock and pine were placed at sites with active woodborer populations, FIDS set out to prove the rarity of PWN in western hemlock. Because of the two-year lifecycle of the longhorn beetle, final results from the trial are forthcoming. Lumber product surveys were also conducted, and in 578 samples from 50 mills in the Pacific and Yukon Region no PWNs were found.

Now that researchers understand how the PWN lives, moves and affects Canadian and European tree species, it is no longer under intense scientific scrutiny. While Canada awaits the results of the European Union's risk assessment, the PWN can resume hitching a ride on the longhorn and munching on pine, unaware that it caused such a stir.

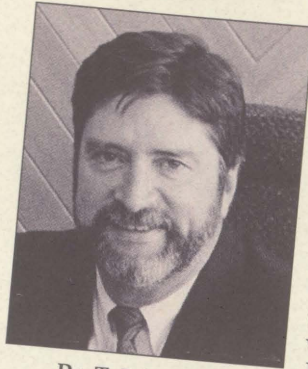


Sampling for pinewood nematodes

Staff Comings and Goings

Dr. T. John Drew

At the end of May, Dr. T. John Drew resigned his appointment as Regional Director General for the Pacific & Yukon Region to pursue other opportunities and challenges in the forest sector. Dr. Drew joined the CFS in January of 1989 after serving for four years as a Director with the Alberta Forest Service. Prior to joining the public service, Dr. Drew worked for almost ten years for the Weyerhaeuser Company. He also served as Chief of Research and Development on the JARI forestry project in Brazil's Amazon region.



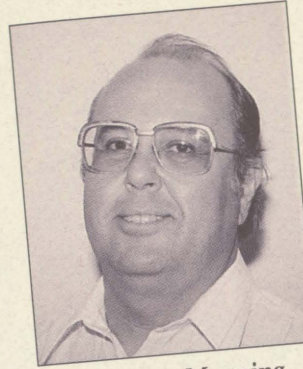
Dr. T. John Drew

Lorraine Blashill

Mrs. Lorraine Blashill has retired from the CFS where she was Acting Director of Communications and Extension. Prior to joining the CFS in 1991, Mrs. Blashill worked as an information officer with the National Research Council in Saskatoon. Her background includes extensive freelance writing credits, five non-fiction books and numerous stage and radio plays.

Colin Wood

Former FIDS Chief Ranger, Colin Wood has retired after 30 years with the CFS. In addition to organizing and overseeing the annual pest surveys in our region, Mr. Wood is well known for his involvement with the forest community and general public.



Dr. Glenn Manning

Dr. Glenn Manning

Dr. Glenn Manning has retired from his position as Forest Economist for the CFS. Dr. Manning began his career with the CFS in 1968 as a senior economist with the Forest Economics Research Institute in Ottawa. In 1974, he transferred to the Pacific Forestry Centre in Victoria, and in 1980 became the supervisor of the Forest Economics Unit.

Mark Messmer

Mark Messmer

Forest Economist Mark Messmer has left the CFS to accept a position with the B.C. Ministry of Forests' Silviculture Branch. Mr. Messmer joined the CFS in 1990, first at the Maritime Forestry Centre and then in Ottawa with the Policy and Economics Directorate. In 1992 he moved to the Pacific Forestry Centre.

Recent Publications

Timber Supply and Silvicultural Investment in an Economic Context for Coastal British Columbia *BC-X-355*

by Mark Messmer.

Production possibilities are estimated for economically available industrial timber supplies for an area of Crown-owned forest along the British Columbia Coast. Biophysical timber inventory is appraised with delivered wood costs and prices, and a simulation model known as the Price Responsive Timber Supply Model is used to project both within-period and over-time supply curves. The results from eight simulation scenarios are presented, where each scenario varies by real future price increase, real interest rate, other price shocks, exogenous harvest

schedules, and three classes of silviculture expenditure. The report concludes with a discussion of how the methodology could be applied operationally to determine both extensive and intensive margins for industrial timber production.

A training guide for laboratory analysis of forest tree seeds *BC-X-356*

by D.G.W. Edwards and B.S. Wang.

This publication describes detailed training guidelines for tree seed testing that are used at national and international levels. A historical overview of tree seed testing in Canada is also given. The basics and requirements of testing are included along with applica-

tions to numerous species. Several exercises complete the text to emphasize theoretical and practical knowledge of testing. Since the material contains all the usual procedures of tree seed testing and follows the guidelines of the International Tree Seed Testing Association, it forms an effective document for all tree seed workers.

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Regenerating B.C.'s northern forest (See story on page 4)

