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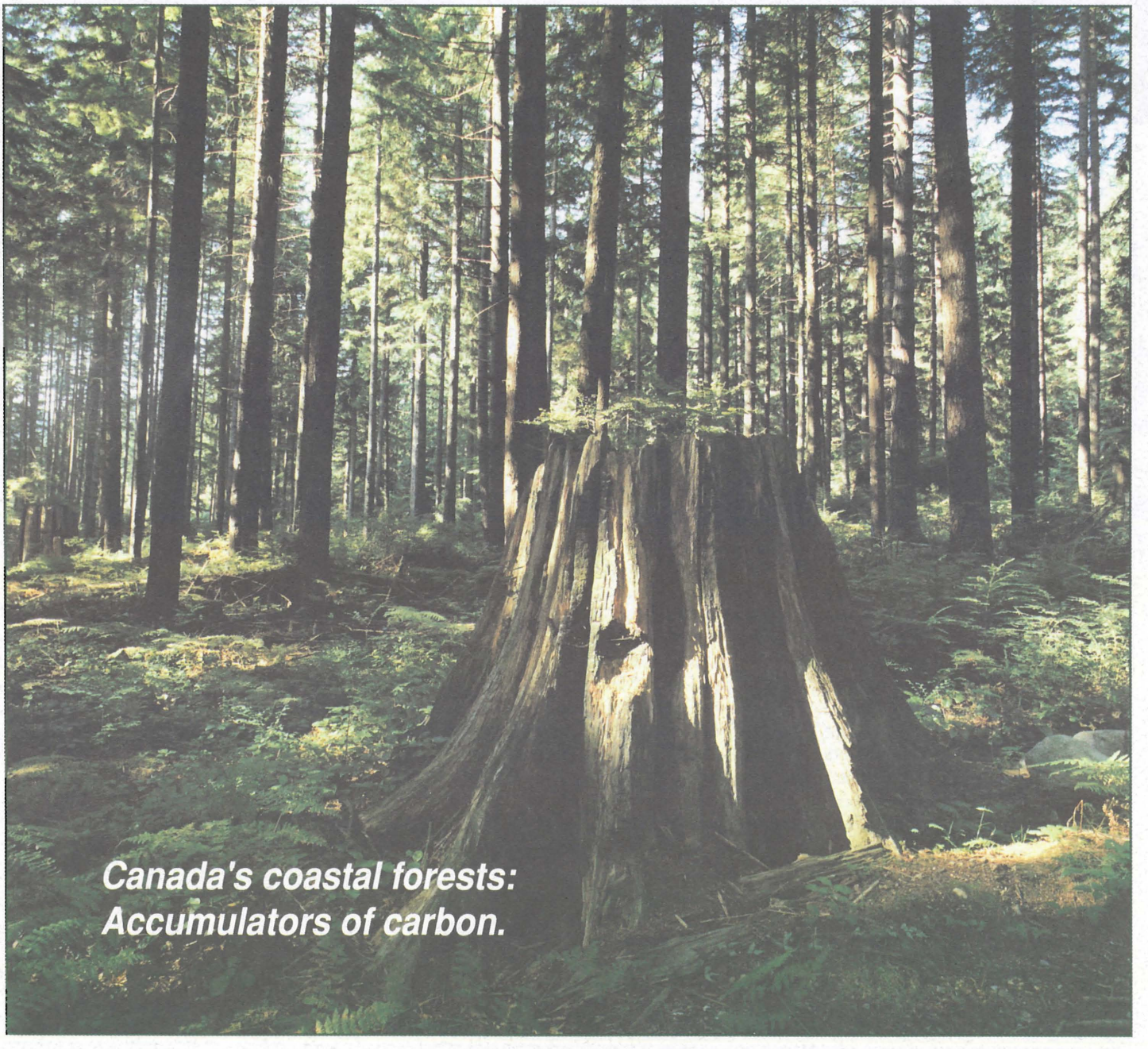
INFORMATION FORESTRY

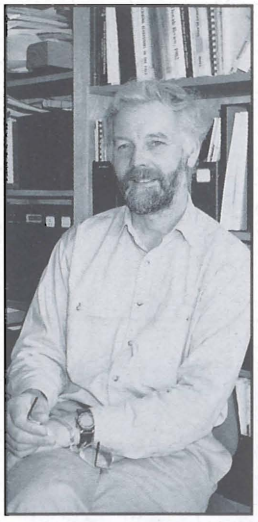
Pacific & Yukon Region



Canada

Forestry Canada Forêts Canada

Stewards of the carbon pool



Doug Pollard

Let's not get carried away with preserving the forest for carbon alone, there are many other worthy uses of forests that can and should be incorporated into a forest-use strategy.

""We are not dinosaurs! And the future is not as bleak as cartoonist Gary Larson once predicted," say Forestry Canada researcher Dr. Doug Pollard[1]" Despite all uncertainties, we can develop resilient strategies for a shift in the forest resource if the climate changes significantly over the next 70 years. Sustainability is a matter of management."

Pollard, who is Program Head of Forest Ecosystem Dynamics, explains that the forest sector is steward of a vast pool of carbon whose size and condition are sensitive to the climate and to management policies. Study results of the carbon pool show that on balance, most of Canada's forest regions, including the coastal forests, appear to be net accumulators of carbon, he says. Preliminary national estimates, albeit very rough, show a net annual accumulation of carbon comparable to Canada's annual emission of carbon from fossil sources.

Pollard compares this to the time when the world's forests were relatively undisturbed by exploitation and were in dynamic equilibrium with the atmosphere, even though wildfires were uncontrolled. Forest neither removed nor contributed carbon dioxide,and neither did mankind.

"The forest sector has been identified as a source of carbon as a result of burning pulp waste for energy and also from slash burning. But what constitutes a net release of carbon dioxide to the atmosphere is open to interpretation," Pollard says, "for in forestry, what goes up can come down."

The use of pulp wastes for energy can be viewed as a displacement of fossil fuel by a renewable energy source. The burning of slash will be at least partially compensated by regrowth of the forest. He adds that much greater sources loom on the horizon: a warming trend, amplified at northern latitudes, could well lead to very substantial emissions of methane and carbon dioxide from the forests and peat lands of these vast areas.

"Let's not get carried away with preserving the forest for carbon alone," he says. "There are many other worthy uses of forests that can and should be incorporated into a forest-use strategy."

Pollard takes the position that, if climate models are correct, change is inevitable, and must be addressed with adaptive rather than with mitigative measures.

"This year, British Columbia planted almost 300 million seedlings that will experience climates to the year 2050 and beyond," he points out. "Foresters are all too aware that they are planting, and therefore planning, for tomorrow's climate. They want information and guidance. What are we to suggest?"

Pollard's advice is caution. Plans should be such that if warming does not occur, no irrevocable damage will be caused by adaptive tactics. He believes it is too soon to modify our planting programs or our protection infrastructure or even to change out harvesting procedures.

"If climate does not change as expected, we shall have spent money needlessly, and worse, we may have seriously comprised our forests," he warns.

Left to it's own devices, nature would not be entirely helpless. There may well be sufficient adaptability in the gene pool of crop and other tree species to cope with the vagaries of even rapid climate change, according to Pollard. As well, British Columbia maintains a very large store of commercial tree seeds and has the capacity to store 65 tonnes in long-term cold storage.

"There are procedures and on infrastructure in the forest sector that can be brought to bear on the task of conserving and distributing genetic materials if needed," he says. "A systematic network of stands, managed as locally-evolved seed sources, coupled with large-scale seed storage, would be an effective strategy to address the threat of diminished adaptiveness in our forest ecosystems."

He believes this could be augmented with a breeding program that could produce varieties selected for specific qualities such as drought-resistance. It is a fail-safe system. If climate does not change, the forest will not have been compromised.

"A comprehensive strategy of *in situ* and *ex situ* gene conservation will serve forestry well under any conditions, and should be in the sector's first line of defense for the future."

Unlike the dinosaurs which had "brains the size of walnuts," we have the ability to reason and to plan. Use these abilities, Pollard urges, and we can prevent our following the path of the dinosaurs.

[1]The Forestry Chronicle, No. 4, Vol. 67, Aug. 1991

Detecting unwelcome visitors

Forestry Canada is establishing a genetics lab and attendant expertise to enable the identification of gypsy moth strains.

On a bright sunny day in May, the young family from Ontario arrived in Vancouver and waited for the moving van. Unknown to them, they were already hosts to visitors from back east. On the undercarriage of their tent trailer were the multiple eggs of the European gypsy moth.

On the same day in May, Agriculture Canada inspectors discovered hatching egg masses of the Asian gypsy moth on a Soviet vessel loading grain in the port of Vancouver.

In both cases, gypsy moth larvae reached suitable host plants and developed to adults during the summer. In late summer, pheromone-baited traps snared 49 male moths demonstrating the presence of these unwanted visitors.

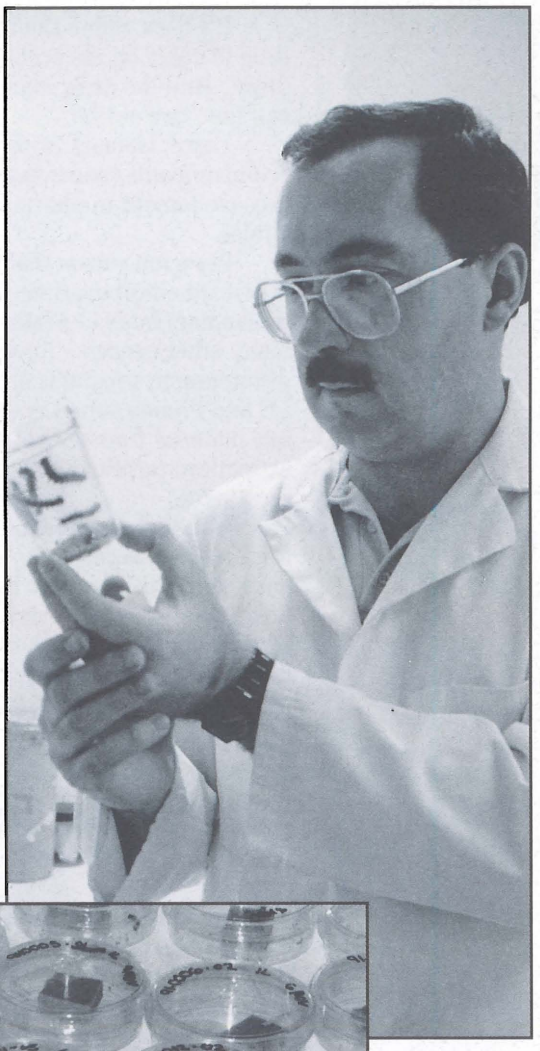
The European gypsy moth has become established along the North American eastern seaboard and it is often a stowaway aboard vehicles bound for B.C. Fortunately, an annual detection survey conducted by Agriculture Canada, Forestry Canada and the B.C. Ministry of Forests provides an early warning of gypsy moth introductions and allows for eradication of the pest before it becomes established in the province.

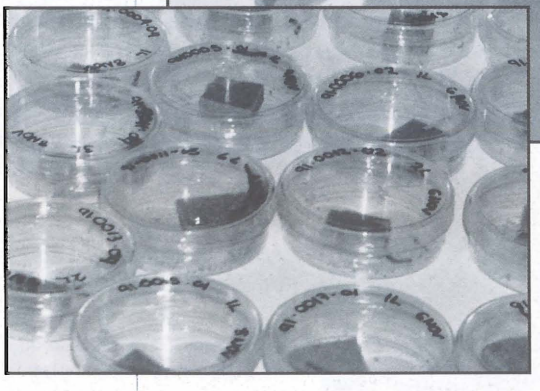
Unlike the European gypsy moth, its relative, the Asian gypsy moth, can fly, posing an increased dispersal risk and consequent risk to the province's forests and future exports. To counter this risk, aggressive trapping and elimination of any introduction is vitally important.

Male moths of the European and Asian strains cannot be distinguished morphologically and this fact complicates identification. Genetic analysis is one of two currently available, albeit experimental, techniques. Presently, B.C. trap catches are sent to Richard Harrison at Cornell University for genetic `fingerprinting'. Another US researcher, Vic Mastro of the USDA-APHIS is developing an identification method based on wing morphometrics.

Now Forestry Canada is establishing a genetics lab and attendant expertise to enable the identification of gypsy moth strains.

"We are raising Asian gypsy moth larvae under quarantine to provide additional adult specimens to enlarge the sample size for the validation of the experimental identification techniques," explains Lee Humble, project co-ordinator. "Relatively few samples have been tested to date."





Lee Humble examines Asian Gypsy Moth larvae raised under quarantine in the lab.

Humble says in order to confirm that the differences found are consistent for both genetic and wing morphometric identification, a larger sample of the variation within gypsy moth populations is essential.

While increasing the sample size, Humble and his research group will also provide material to assist other researchers in developing new diagnostic tools for the identification of the persistent gypsy moth, the indiscriminant traveller of the world.

Tree of life yields promising new drug

There's more to the yew story than harvesting bark.

It's been called the most exciting new drug to come on the scene in the last 10 or 15 years. And the drug comes from what many call the "tree of life."

Taxol, isolated from yew bark, is the promising anti-cancer agent that is causing this excitement in pharmaceutical research circles.

Research shows that taxol is effective in the treatment of ovarian cancer and now researchers hope to determine its effect on many other cancers. Research and development programs are underway in the US and France aimed at the production of the raw material from yew trees and the extraction, purification and synthesis of the drug taxol.

Although taxol is found in all parts of the tree and in a variety of species of yew, interest has been focused on the Pacific yew or *Taxus brevifolia*. Bristol-Meyers Squibb, holders of an R&D contract with the US National Cancer Institute for clinical developement of taxol, plan to obtain some 158 000 kilograms of dried bark from British Columbia.

Canada's role in this unfolding drama of medical research involves researchers at the Pacific Forestry Centre.

Forestry Canada researchers will be looking into the role of natural stands of the Pacific yew in the supply of taxol, and of factors affecting the establishment and growth of new stands. Specifically, Alan Mitchell will investigate the physiology of the growth of the species and its regeneration regarding its resilience to cutting and its optimal growing conditions. George Edwards will research yew seed germination and storage while Doug Pollard will be grappling with the issues analysis of this complex subject.

"There's much to learn about the sustainable development of yew, its distribution, regeneration, growth, genetic make-up and other factors," says Pollard. "It is unique in touching so many important issues: health and welfare, biodiversity, old growth, multiple use, biotechnology and conservation of genetic resources."

Delayed trip plants seeds for discussions

Frank Portlock collecting seeds.

The Iraqi invasion of Kuwait became an advantage of circumstances for Forestry Canada's Seed Service Officer Frank Portlock.

"I was supposed to go to a meeting of the Organization for Economic Co-operative Development (OECD) this past February," he explains. "But because of the war, I didn't attend. Instead I went to Paris and Brussels this fall and had the opportunity to have one-on-one meetings which probably wouldn't have been possible during the scheduled meeting when everyone else was there."

Portlock's discussions during these meetings centered on continuing importation by European Community (EC) countries to OECD source-identified seed from British Columbia, specifically Sitka spruce and Douglas-fir. OECD has four seed importation categories: source-identified or wild stand collections; select stands; untested seed orchards; and tested seed orchards. There are no wild stands in Europe so the source-identified seed is imported from North America under special EC regulations.

"In 1992, in a move toward a self-sufficient European community, all this will come to an end," Portlock says. "This will be a big problem for Canada as 95 percent of our export seed is in the source-identified category. And if this does happen, our exports will be severely affected."

On the other hand, there are ten OECD registered untested seed orchards in B.C. which so far have been unable to sell seed in Europe. "If source-identified seed is eliminated in Europe, maybe these sources can pick up the slack," he says.

Was he able to accomplish his objective of convincing the Europeans to abandon this planned action?

"They became more aware of the impact of their possible decision regarding source-identified seed," Portlock says. "And there will be another meeting in 1993."

That's a meeting he doesn't intend to miss - unless another major international incident like the invasion of Kuwait prevents him from going.

R & D group forms in remote sensing

This project, organized and supported by NASA, integrates aircraft and satellite remote sensing, field data and geographical information systems.

More than 40 per cent of Canada's marketable timber is found in British Columbia, much of it on rugged, mountainous terrain. Large variations in elevation make analysis complex while reducing the spatial scales over which distinct biogeoclimatic differences occur. These facts increase the need for decision support systems for forest and environmental management in B.C. to help to determine the best management of the forest resource.

The Pacific Forest Centre has recently added a significant component to its abilities to provide this help - an R&D group in remote sensing and image analysis, geographical information systems, and artificial intelligence methods and systems. Heading this group is Dr. David Goodenough previously from the Canada Centre for Remote Sensing (CCRS) in Ottawa, a branch of the Department of Energy, Mines and Resources.

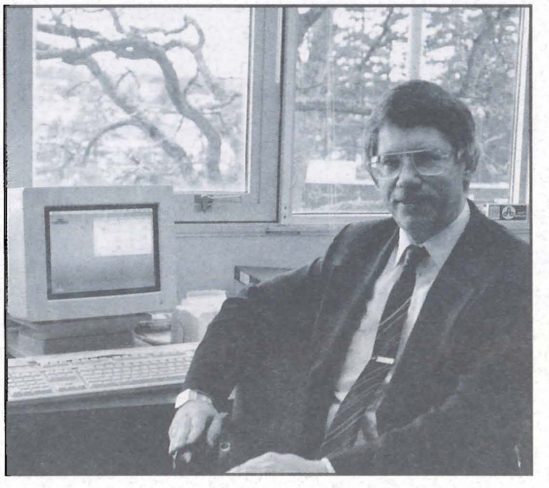
"One of the things I'm bringing to PFC is a project called SEIDAM, System of Experts for Intelligent Data Management," Goodenough says. "This project, supported by NASA (National Aeronautics and Space Administration of the USA), integrates aircraft and satellite remote sensing, field data and geographical information systems with environmental models."

The SEIDAM project is an artificial intelligence system and is supported in Canada by the Department of Energy, Mines and Resources; Industry, Science and Technology Canada; and Forestry Canada. Goodenough's project is the only one outside of the United States that has been included in NASA's Advanced Information Systems Research Program.

"The SEIDAM project will be able to answer many questions about the B.C. forests," Goodenough says. "For example, what is the timber volume in specific areas? What is the health of the forest and what environmental stresses exist in the forest?"

The ability to make these determinations is an outgrowth of developing trends in remote sensing like higher spatial and spectral resolution and more microwave measurement capability. "The imaging spectrometer could measure, from an airplane, the chlorophyll content of a particular part of the forest," Goodenough says. "This is new for us and there's a great deal of research necessary."

The necessary research will be conducted from Forestry Canada in Victoria and CCRS in Ottawa and Dr. Goodenough and his team of experts are already hard at work doing just that. The SEIDAM project will also involve scientists from industry and academia. Through technology transfer to industry, intelligent information systems will be available to contribute to sound management decisions here while helping to make assessments of global effects on forest ecologies in mountainous regions as well.



David Goodenough

Forestry Bits

Pinewood nematode control targeted as green lumber exports to E.C. given reprieve

In mid-December the European Community (EC) voted to allow the importation of unseasoned softwoods from Canada for one more year. The EC's objection to importing green lumber is based on the assumption that it may contain the pinewood nematode and its carrier, the sawyer beetle.

The potential impact of Canada not being allowed to export to EC countries would be extremely serious to the Canadian economy since close to $1 billion worth of unseasoned lumber is currently shipped to the EC each year - $700 million of which comes from British Columbia.

Plant health officials in the EC are concerned that the possible presence of pinewood nematodes in imported green lumber could introduce wilt disease to European forests.

Currently Canada has a "derogation" or exemption for green lumber as long as it is accompanied by a mill certificate ensuring that the lumber is free of bark and grub holes. This derogation order has been extended to December 31, 1992.

In anticipation of a ban on importing green lumber by the EC, several months ago a research project co-financed by the federal government and the provinces, as well as the industrial and academic sectors, began to evaluate the use of heat treatment (pasteurization) in the eradication of pinewood nematode and its vectors in softwood lumber.

A team of scientists from Forintek's Ottawa and Vancouver laboratories, Forestry Canada's Pacific Forestry Centre in Victoria and the Universities of New Brunswick and Simon Fraser are also looking at alternative technologies, such as electron beam irradiation, radio frequency microwaves and chemical treatments. The Canadian team will liaise closely with an EC team of scientists led by a researcher from the Irish Science and Technology Agency in Dublin. Final field studies in Canada will involve both Canadian and EC scientists.

Drs. Jack Sutherland, a research pathologist, and Alan Van Sickle, the head of Forest Insect and Disease Survey, at Pacific Forestry Centre, have been actively involved in the research project.

About two-thirds of the lumber going to Europe comes from the B.C. coast and one-third from interior forests. According to the Council of Forest Industries of B.C., interior mills kiln-dry about 85 per cent of their output, but only 14 to 15 per cent of coastal lumber is similarly treated.

A study prepared for Forestry Canada estimated it would cost B.C. coastal sawmills some $150 million for extra kiln capacity to comply with the EC requirement, and that kiln drying would add $72 million in annual operating costs for the mills.

It is hoped the results of this research study will provide enough evidence for the EC to eliminate the ban altogether.

Toward a national forest strategy

In 1987, Canadians endorsed a National Forest Sector Strategy. In the fall of 1990, the Canadian Council of Forest Ministers called for the preparation of a new strategy through a series of public consultations. Throughout 1991 the Council sponsored five regional forums across Canada and held other consultations to develop this new National Forestry Strategy, subtitled `Sustainable Forests: A Canadian Commitment'. Suggestions from the public and from national workshops form the basis of the strategy which will be presented at the National Forest Congress in Ottawa March 2 to 4, 1992. It will be subsequently distributed in Canada and abroad.

National Forest Week
May 3-9, 1992

Business, environment meet at Globe '92

Forestry Canada will be one of approximately 700 exhibitors from around the world at Globe '92 in Vancouver, March 16 to 20.

The Forestry Canada display will focus on integrated resource management systems as tools to help Canada achieve sustainable development. We will demonstrate how Forestry Canada brings the tools together and applies them to forest management issues involving data and management and information analysis and presentation.

The Globe '92 Conference will bring together over 3 000 people from more than 80 countries to brainstorm and to develop innovative strategies for achieving sustainable development.

Delegates attending the trade fair session will be able to do some comparison shopping for state-of-the-art tools and techniques for environmental management; discover investment opportunities in the environmental industry; develop business relationships, including joint ventures and strategic alliances essential in the global marketplace; and see demonstrations of new products developed in response to environmental challenges.

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Recent Publications

Sources of Growth Variability in Interior Douglas-fir

G.M. Bonnor, R. de Jong and P. Boudewyn

Data from 92 permanent sample plots was obtained to assess the growth of uneven-aged stands of Douglas-fir in the Interior Douglas-fir zone of British Columbia and the factors influencing the growth.

BC-X-328

Simulation of mountain pine beetle (Dendroctonus ponderosae Hopkins) spread and control in British Columbia

Alan Thomson

A method of predicting spread of mountain pine beetle through the use of a simulation model is described, and the assumptions underlying the method is explained.

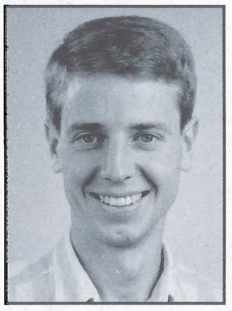
BC-X-329

Reports and Publications: Pacific and Yukon Region - 1990

A listing of the reports and publications authored by staff of Forestry Canada: Pacific and Yukon Region during 1990.

BC-X-330

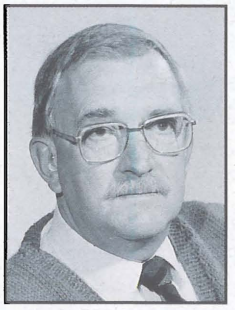
Staff Comings & Goings



Rene de Jong

Terry Honer

Roy Shepherd



Stu Whitney

We welcome to Forestry Canada: Pacific and Yukon Region the following new staff members:

Glen Armstrong joins the Forest Economics group to conduct research on silviculture decision models. He was senior research analyst with the Forest Economic and Policy Analysis (FEPA) group at U.B.C. and has also held various positions with the University of Alberta and worked as a resource analyst with the Alberta Forest Service.

Andrea Eastham has joined Forestry Canada's Prince George District Office as Forestry Officer: Stock Production and Forest Regeneration. Andrea comes to Forestry Canada from the Ministry of Forests' Red Rock Research Station where she was a reforestation biologist.

Rene de Jong joined the Timber Production research program as a mensurationist working with Dr. Mike Bonnor. His duties include analyzing forest growth and yield data. He received his B.Sc.F. in 1985 from the University of British Columbia.

David Goodenough (see story on page 5) joined the region as Program Head of the Advanced Forest Technology research program on November 1. Dr. Goodenough came to the region from the Canada Centre for Remove Sensing in Ottawa where he was Chief Research Scientist, Methodology Section.

Ian Moss joins the Prince George District Office as Forestry Officer: Silviculture Growth and Yield. He was manager of Silviculture at IFS Forestry Consultants of Prince George. Both he and Andrea Eastham (see above) report to Dr. Keith McClain Research Manager at the Prince George District Office.

Jason Nault has joined the Region as research chemist specializing in analytical organic chemistry, working with Dr. John Manville. Dr. Nault formerly worked as a research scientist at FORINTEK before joining the staff of PFC.

Over the past few months we saw the retirement of three of our senior research scientists:

Terry Honer, Senior Mensurationist, retired after 35 years service with Forestry Canada. Dr. Honer, who is a professional forester registered in Ontario and B.C., has served with Forestry Canada in various research and management capacities since 1956.

Honer is the senior author of a 1985 report entitled "Canada's Forest Area and Wood Volume Balance 1977-81" - a comprehensive assessment of the status of Canada's forest resource and its rate of change under present levels of management.

Roy Shepherd, a research scientist specializing in entomology retired in September with 39 years of service to the government of Canada. Dr. Shepherd's research focused on forest insect ecology as it applied to defoliators of coniferous trees in western Canada. His career with Forestry Canada began in Alberta and the Rocky Mountain Parks Region in 1952; he transferred to the Pacific and Yukon Region in 1970.

Stu Whitney also retired in September following a 33-year career with Forestry Canada as a pathobiologist. Dr. Whitney began his career with the department in 1958 as a research officer studying tree nursery diseases in Quebec. In 1964 he moved to Alberta where he conducted mycological research, moving in 1971 to the Pacific and Yukon Region where he worked on the pathogens of bark beetles until his retirement.

INFORMATION FORESTRY