

INFORMATION
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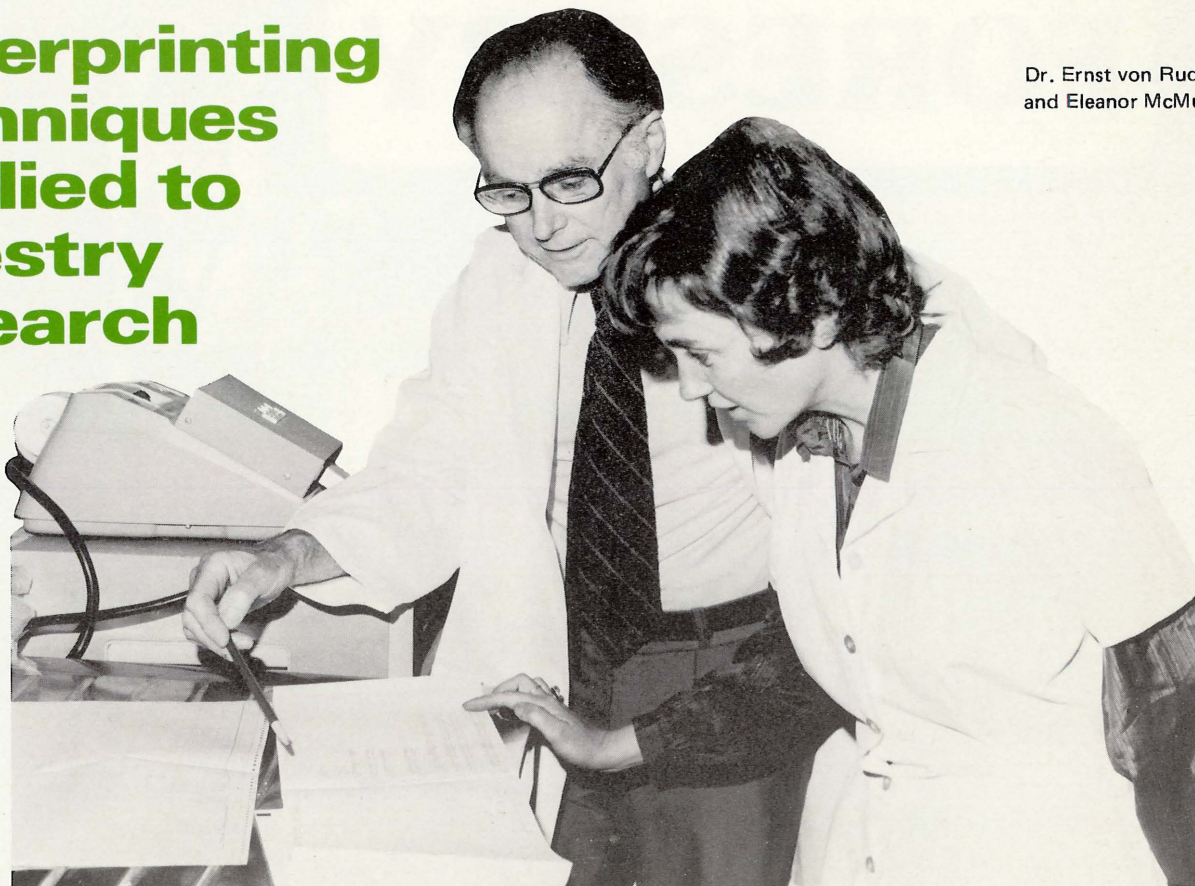
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Fingerprinting Techniques Applied to Forestry Research

Dr. Ernst von Rudloff
and Eleanor McMullan



Two researchers at PFRC are attempting to "fingerprint" trees and tree seed as a means of identifying the geographic origin of the specimen.

Dr. Ernst von Rudloff, a research scientist on a three-year secondment to the Centre from the Prairie Regional Laboratory of the National Research Council in Saskatoon, Saskatchewan, and **Eleanor McMullan**, a biochemist with PFRC, have been studying the fingerprinting identification process for over a year - a process which they hope may some day be of practical value to forest genetics and tree improvement programs.

Dr. von Rudloff's work originated several years ago when he began studying the terpenoid patterns of Douglas-fir and other Canadian conifers. Terpenes are chemicals found in all conifers and many plants. They differ from species to species and, among

other things, are responsible for giving off characteristic odours such as the smell associated with pine, mint, sage, etc.

Dr. von Rudloff discovered that there were very distinct chemical patterns associated with Douglas-fir which originated in the interior as opposed to trees which originated from the northern coastal region and the southern coastal region. The inheritance of terpene patterns was studied with **Dr. G.E. Rehfeldt** of the U.S. Forest Service in Moscow, Idaho, and it was confirmed that they were under strict genetic control. Dr. von Rudloff is continuing his research on lodgepole pine with similar results and will study spruce next.

Because terpenes are genetically fixed it is hoped these studies will lead to valuable information on the genetic variability within species.

Terpenes also play a part in the host/insect interaction process and further studies may provide forest managers with information on which species in a particular location may possibly be susceptible to attack by a particular insect.

Encouraged by the results of her colleague's experiments, Eleanor McMullan decided to investigate and apply the fingerprinting technique to tree seed.

The Pacific Forest Research Centre is the official seed testing laboratory for forest reproductive material exported from British Columbia and the Yukon to the European market. Several countries which import forest tree seed in commercial quantities require the seed be certified as to point of origin. (See story in Vol. 6 No. 3, Fall 1979 Information Forestry.) This means Seed Inspectors must travel throughout the

province and territory verifying the source of seed through a series of inspections of collection sites, extractories and seed stores.

If Eleanor can get the same precision or better from her experiments with fingerprinting seed that Dr. Rudloff achieved with tree material, it might eliminate the need for the time consuming and costly travel involved in the certification process.

Because seeds don't have large amounts of terpenes Eleanor is investigating another chemical property common to seed - isozymes, which are also closely aligned to genetic properties.

Her initial study involves looking at some Douglas-fir seed already on hand in the lab. The results were most encouraging.



"We could see the difference in the isozyme patterns right away. There was a clear cut distinction between the interior and coastal seed," said Eleanor. "However, it is necessary to refine our testing techniques much more in order that we can locate origin of seed by both latitude and longitude."

In early spring she set out to collect cones and branches from lodgepole pine trees at ten different sites

across British Columbia between the longitudes of 116° and 126°. The personnel of the B.C. Ministry of Forests Ranger Stations aided her in selecting accessible stands of appropriate age trees.

Isozyme tests will be conducted on the seed collected from the cones to determine what pattern, if any, can be associated with lodgepole pine seed collected within the 10° longitude zone. At the same time Dr. von Rudloff will be conducting terpene analysis on the branches of the same trees to determine if any correlations can be drawn between the information obtained by the two different testing techniques.

Although there are a lot of questions yet to be answered and a lot of testing left to do, the results so far are promising and encouraging.

New Director Appointed

D.R. (Ross) Macdonald, a former Deputy Director of the Pacific Forest Research Centre, was appointed Director of PFRC effective July, 1980.

Immediately prior to this appointment Ross was Director of Forest Protection at Canadian Forestry Service Headquarters in Ottawa since 1977. In this position he was responsible for CFS research across the country on pest and disease control and forest fire control. Previous to that he held various positions at PFRC including Deputy Director from 1972-77, Program Manager of Forest Protection research from 1969-77, and Section Head of Forest Entomology from 1968-69. From 1952-68 he conducted studies of aerial spraying of spruce budworm at the Maritimes Forest Research Centre in Fredericton, N.B.

Ross' career with CFS began as a summer student at the Forest Insect

Laboratory at Sault Ste-Marie, Ontario from 1947-51. He received his BSc.F. at the University of Toronto in 1952 and his M.F. at the University of Michigan in 1957.

In 1975 Ross was the first Canadian individual scientific visitor to the People's Republic of China to study the use of biological control of pests in that country. In 1977 he led a Canadian delegation to study biological control of forest pests in the USSR.

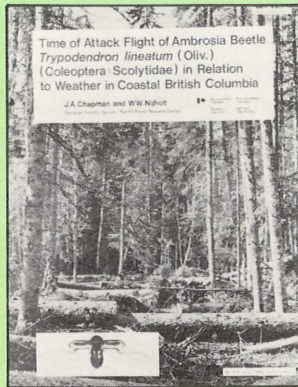
Ross replaces **Mike Drinkwater** who retired as Director of PFRC 18 months ago. **Dr. Terry Honer**, who has been Acting Director during that period, has been seconded by **Les Reed**, the newly appointed Assistant Deputy Minister of the Canadian Forestry Service (see page 5), to his office to work on the Forest Resource Data Program and other tasks.



Ross Macdonald

Recent Publications

Copies of these publications may be obtained by filling out the enclosed card and returning it to the P.F.R.C. Information Office.



Time of Attack Flight of Ambrosia Beetle *Trypodendron lineatum* (Oliv.) (Coleoptera: Scolytidae) in Relation to Weather in Coastal British Columbia

J.A. Chapman and W.W. Nijholt

Temperature records over 48 years and beetle flight records are used to develop guidelines to aid in forecasting attack flight activity of *Trypodendron lineatum* (Oliv.) in coastal B.C. Selected references are given to enable the reader to obtain additional information.

BC-R-5

1980 Cone Crop Bulletin

Publication presents 1979 cone crop ratings for natural stands divided by tree seed and regions and, within region, by species, seed zone and elevation.

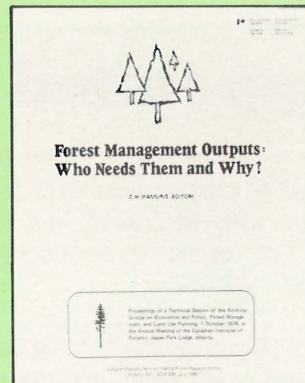
British Columbia Ministry of Forests /
Canadian Forestry Service Joint
Report No. 11

A Guide to Insect Pests in Douglas-Fir Seed Orchards

D. S. Ruth

This guide covers the majority of insects that feed upon cones and seeds, or destroy potential cone-bearing branches, in Douglas-fir seed orchards. Emphasis is on the recognition of the various stages of insect development and damage. A section is included on insect control.

BC-X-204

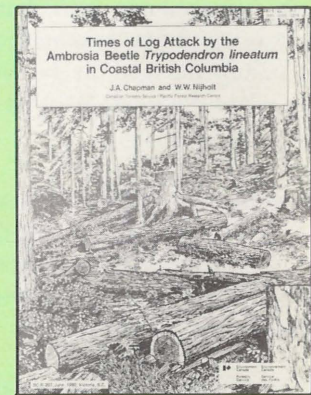


Forest Management Outputs — Who Needs Them and Why

G.H. Manning

Proceedings of the Economics and Policy, Land Use Planning and Forest Management Working Groups technical session held at the 1979 annual meeting of the Canadian Institute of Forestry held October 1-4 in Jasper, Alberta. The aim of these proceedings is to make Canadians more aware of the problems and possibilities of integrated resource management.

BC-X-206



Times of Log Attack by the Ambrosia Beetle *Trypodendron lineatum* in Coastal British Columbia

J.A. Chapman and W.W. Nijholt

Guidelines developed to aid in forecasting attack flight activity of *Trypodendron lineatum* in coastal British Columbia are presented. Further details may be found in BC-R-5.

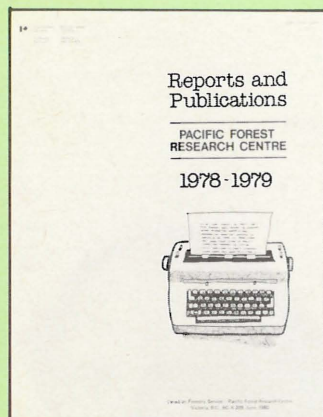
BC-X-207

Shore and Landscape Analysis of the Western Section of the Capital Regional District of British Columbia

S. Eis and D. Craigdallie

The purpose of this study is to provide environmental background for planning and preserving the most important features of this coast for public use. Eleven landscape units are described in terms of their vegetational characteristics and the impact of human activity evaluated.

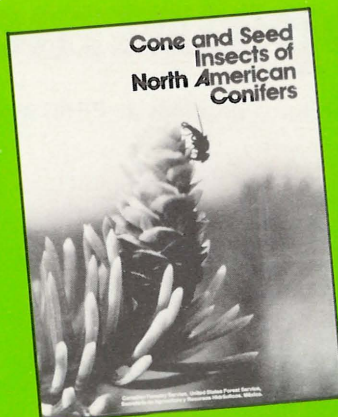
BC-X-208



Reports and Publications, Pacific Forest Research Centre, 1978 - 79

List of the reports and publications published by PFRC in 1978-79 which are available from the Centre or CFS headquarters in Ottawa.

BC-X-209



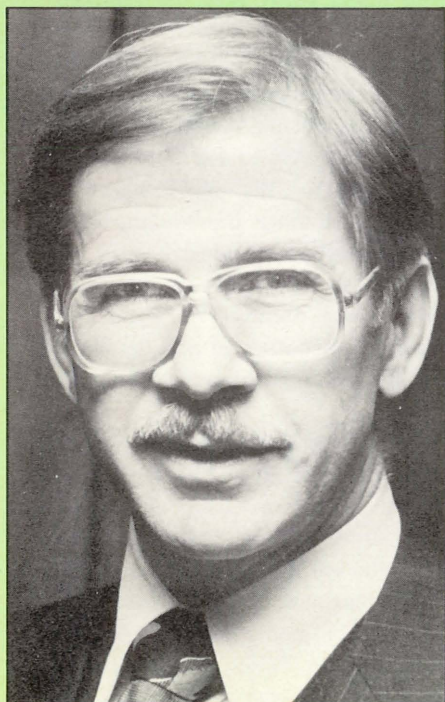
Cone and Seed Insects of North American Conifers

Canadian Forestry Service / United
States Forest Service / Secretaría de
Agricultura y Recursos Hidráulicos,
Mexico

SPECIAL REQUEST PUBLICATION

This book, which was jointly produced by the governments of Canada, the United States and Mexico, was specifically written for the practicing forester and others involved with seed orchards or seed production. This 122-page publication, which is illustrated in full colour for ease of identification, summarizes information on the recognition, biology and importance of cone and seed-destroying insects of Canada, the United States and Mexico.

Quantities are limited but may be obtained by writing: Canadian Forestry Service, Environment Canada, Ottawa, Ontario, Canada K1A 0E7.



Les Reed

LES REED APPOINTED ASSISTANT DEPUTY MINISTER

Environment Minister **John Roberts** recently announced the appointment of **F.L.C. (Les) Reed**, forest economist and consultant from Vancouver, to the newly created position of Assistant Deputy Minister of the Canadian Forestry Service. His appointment is effective mid-August.

The appointment of an ADM, Forestry, raises the status of the Canadian Forestry Service, previously headed by a director-general, to that of a separate service within the Department of Environment.

"I believe the appointment of

Mr. Reed will provide the strong leadership the CFS needs to coordinate federal policies toward promoting better resource management and forest industry development," said Mr. Roberts.

Mr. Reed is widely known and respected in the forest community in Canada and abroad. Until his appointment he was president of F.L.C. Reed and Associates Ltd., consulting forest economists, Vancouver, B.C. He has been advisor to governments, agencies, private companies and advisory committees and a frequent speaker at national and international conferences on forestry matters.

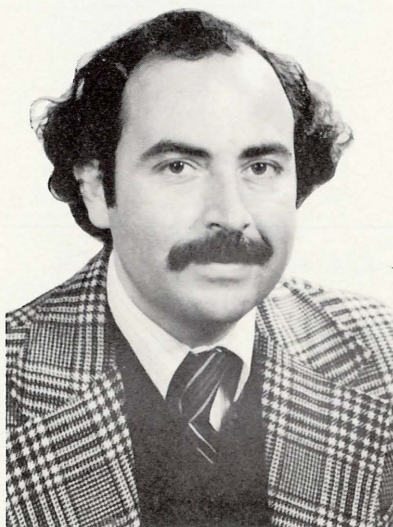
PFRC Staff Appointments

The following appointments to management and research positions at PFRC have been announced:



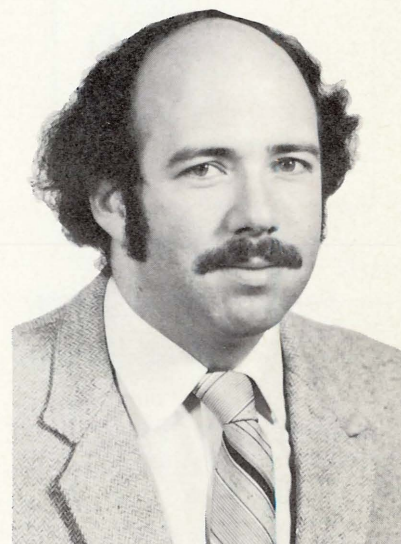
Dr. Glenn Manning has been appointed Program Manager of Forest Economics. Dr. Manning, who has been a Senior Economist with PFRC for the past six years, will be responsible for providing policy advice to the staff and senior executive of the Department of the Environment, as well as its co-operators. Program goals include providing the information base in forest economics in British Columbia and the Yukon as well as overseeing the operation of the Pacific region's program in energy from forest biomass.

Dr. Manning is a graduate in Forestry of the Virginia Polytechnic Institute and has a PhD. in forest economics from Iowa State University. Prior to joining PFRC in 1974, Dr. Manning was with the Forest Economics Research Institute in Ottawa. Dr. Manning succeeds **Dr. Michael R.C. Massie** who left PFRC in 1978 to join a Victoria consulting firm.



Dr. René Alfaro has been appointed Damage Appraisal research scientist. His responsibilities include developing, testing and implementing appropriate sampling methods to identify and quantify losses by forest pests. He will also be responsible for identifying immediate and long term effects of pest attack on the quantity and quality of the forest, as well as developing information for benefit-cost analysis of any necessary control actions.

A native of Santiago, Chile, who received his Canadian citizenship in 1979, Dr. Alfaro earned his B.Sc.F. from the University of Chile in 1972 and his Master of Pest Management from Simon Fraser University in 1977. In the spring of 1980 he received his PhD. in forest entomology from Simon Fraser University.



Gordon E. Miller of Victoria, B.C. has been appointed to the position of forest entomologist in the cone and seed insect study area. He replaces **Alan Hedlin** who recently retired after 22 years with the Canadian Forestry Service. In his new position Mr. Miller will be responsible for planning and conducting research to assess pest significance and for the development of practical methods of reducing insect-caused seed losses. He will also be responsible for developing guidelines by which seed orchard managers can formulate benefit-cost analysis for control actions against specific pests.

Mr. Miller received his B.Sc. in 1972, his M.Sc. in 1976 and a master's degree in pest management in 1979 from Simon Fraser University. He is currently enrolled in a PhD. program in the Department of Biological Sciences at Simon Fraser University. Immediately prior to joining the staff at PFRC Mr. Miller was employed as a biologist with the British Columbia Ministry of Forests.

Image Analysis System Inaugurated

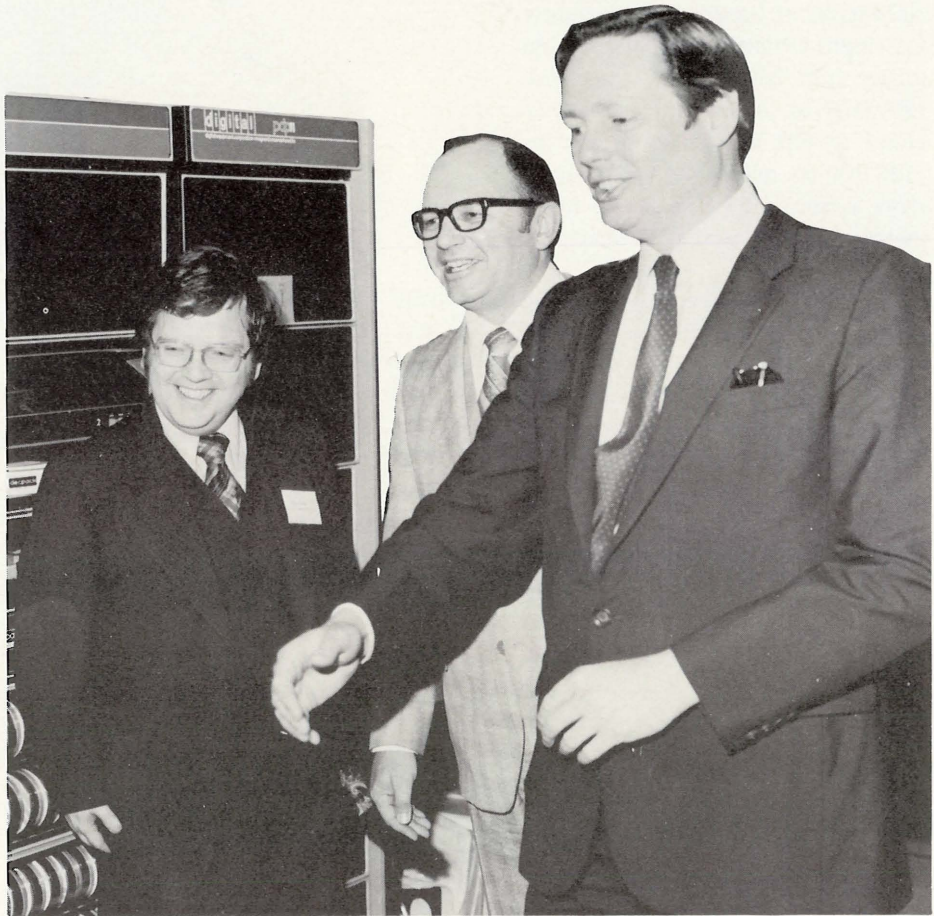
Environment Minister **John Roberts** officially inaugurated the \$402,000 image analysis system at PFRC known as GEMS - the GEographic Monitoring System, which will allow federal scientists to conduct research on natural resource distributions in B.C. and the Yukon.

By plugging into the data collected by the LANDSAT satellite which crosses western Canada every 18 days, the GEMS 300 is able to take the statistical data collected and convert it to visual images. It has the capability to analyse digital data in any form thus making it an invaluable tool for the display and manipulation of data base information. Information relayed back by LANDSAT permits resource analysts to classify the forest, map outbreaks of insects, determine fire losses and collect information on wood supply and logging practices.

Images of a particular area, taken at different dates, can be superimposed to measure the change in the status of the resource. The system is programmable to use colour to differentiate between land masses and water for instance, between coniferous and deciduous stands, between roads and rivers.

Although images provided from the satellite are on a scale of 1:1,000,000 they can be blown up to 1:50,000 used currently in topographical mapping.

Coupled with this image analysis capability is a complex retrieval system which will enable researchers and resource personnel to enter onto magnetic tape all the information available since the satellite commenced collecting back in the early 1970's. This information can be portrayed in a map, an image or



Environment Minister John Roberts (right) officiates at inauguration ceremony of GEMS 300. On hand to familiarize the Minister with the system were Dr. Terry Honer, Acting Director of PFRC at the time and Fergus Heywood, Head of Computer Operations.

a graphic display in a full colour range. It will provide a new perspective as well as a more complete picture of our resources and how they are changing from year to year.

Although the system was developed by the Canadian Forestry Service, in conjunction with Energy, Mines and Resources and Supply and Services Canada, it will be of benefit to the total environment, not just forestry. It will provide a regional capability to

monitor federal projects in the Territories, evaluate environmental impacts, watch changing conditions of wildlife and urban and rural developments.

"This kind of technology can give managers improved forest resource information which will enable them to better plan their resource management strategies. I hope they will investigate the usefulness of this Canadian technology," said Mr. Roberts in his opening remarks.

Yukon Shrinks 10% In One Year

It's a matter of record now - the size of the Yukon Territory is actually 10 per cent smaller in area than the official figures of Canada had previously indicated. Officially the Yukon is no longer 536 325 square kilometres (207,076 sq. miles) in size but is closer to 482 515 square kilometres (186,300 sq. miles) - and that represents a loss of 53 810 square kilometres or 10 per cent of its territory.

Dr. Y. Jim Lee



Dr. Y. Jim Lee, a remote sensing specialist with the Pacific Forest Research Centre, has been working with the design of computer systems for the storage and retrieval of information. During the course of his work on a pilot project in the Yukon in 1976 he discovered that the Yukon was actually smaller than had previously been recorded.

Dr. Lee checked his figures

with the Department of Energy Mines and Resources and to everyone's amazement they agreed that in fact figures showing the size of Yukon at 536 325 square kilometres were wrong!

The next step was to change the record books. Statistics Canada publishes the annual Canada Yearbook and in the 1976-77 edition, as in all previous editions, the size of the Yukon was listed at 207,076 square miles, or

536 325 square kilometres. However, after verification the 1978-79 Canada Yearbook now shows the size of the Yukon at 482 515 square kilometres.

It's unlikely the discovery of this error will result in ramifications of any importance; however, just for the record the Yukon only figuratively shrank by 10 per cent, with Canada as a whole, shrinking by .5 per cent, in one year.

REFORESTATION EXPERT BORROWED BY ONTARIO GOVERNMENT



Jim Kinghorn, a researcher at PFRC and expert in reforestation, has accepted a one-year assignment with the Ontario Ministry of Natural Resources to assist the Ontario government with their reforestation program.

His specific assignment will be to develop a strategic plan for the Ontario

government's container and bare root program in the production of reforestation planting stock. Provincial studies indicate a need of 80 million bare root and 36 million containers by 1984-85. Current production targets are 75 million and 12 million respectively.

Mr. Kinghorn was responsible for the development of the styroblock container system now being used extensively throughout British Columbia and other parts of Canada and the United States by government and industry in seedling production.

It is hoped that not only will this temporary assignment benefit the Ontario government, but that Mr. Kinghorn will bring back to British Columbia valuable information on the progress, problems and challenges of forest renewal in other parts of Canada.

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