



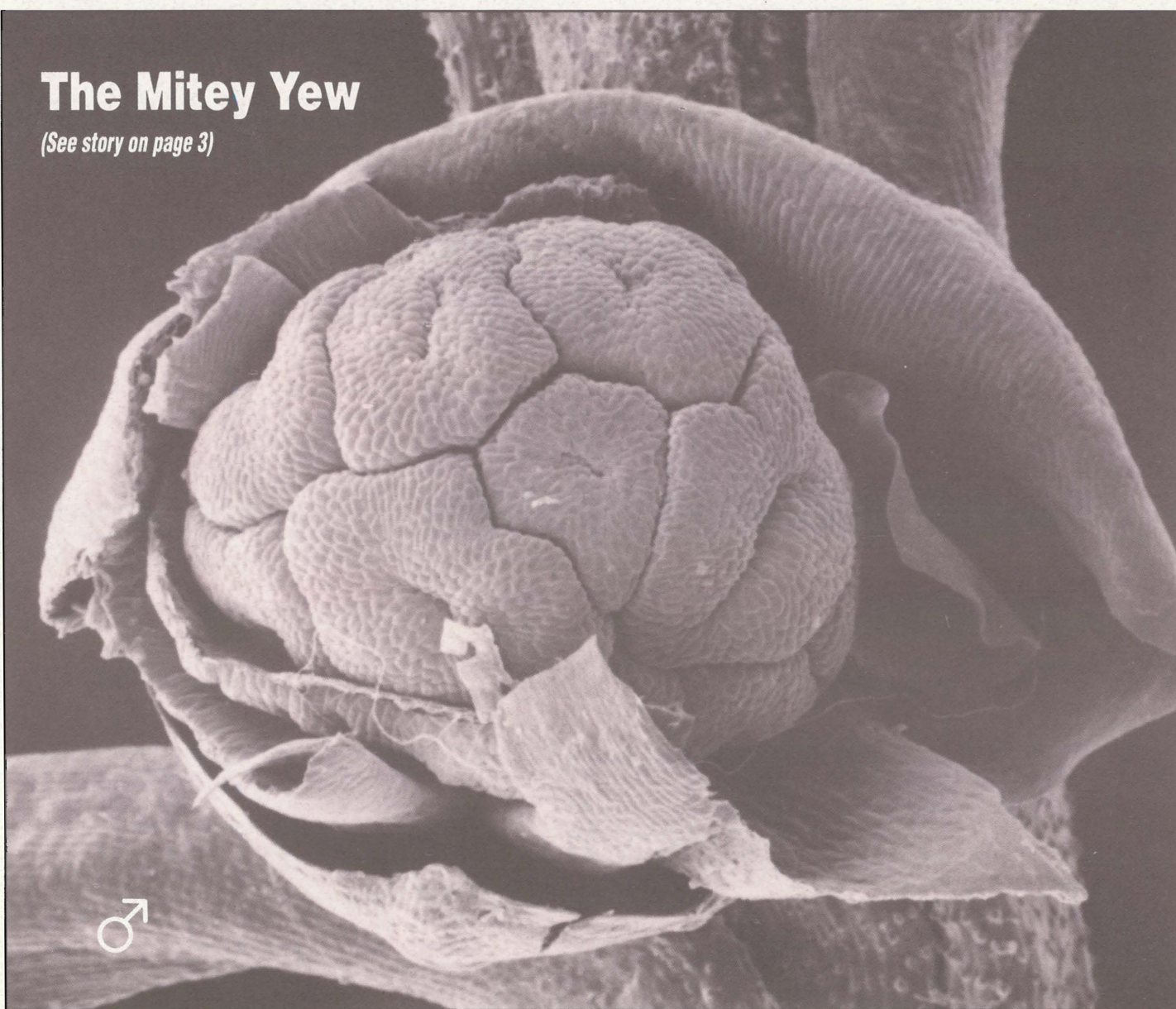
FEBRUARY 1994

INFORMATION FORESTRY

Pacific & Yukon Region

The Mitey Yew

(See story on page 3)



Natural Resources
Canada
Canadian Forest
Service

Ressources naturelles
Canada
Service canadien
des forêts

Canada

Scientist puts NMR to work on forests

"PFC's NMR has proven to be an invaluable tool in research into carbon cycling and soil composition.

In 1990, the Pacific Forestry Centre established one of the few Nuclear Magnetic Resonance (NMR) facilities in the world dedicated to Forest Research. The driving force behind this facility is Dr. Caroline Preston, a researcher in the Ecosystem Dynamics program at the Canadian Forest Service's Pacific Forestry Centre.

Although NMR spectroscopy has long been used by chemists to analyze the molecular structure of substances, forest science has lagged behind other disciplines in applying this technique. Few scientists in this field possess the knowledge of forest science and chemistry along with NMR skills necessary to make use of this technology. Dr. Preston is one of these rare few.

Dr. Preston is determined to expand the use of NMR in forestry research world-wide.

Preston has maximized the benefits of the NMR facility at the Pacific Forestry Centre by working on cooperative studies, both with industry and with universities. This has increased interest and diversified the use of this technique in forestry, and has produced graduate students with NMR expertise applicable in many areas of forestry.

PFC's NMR has proven to be an invaluable tool in research into carbon cycling and soil composition.

To date, Dr. Preston has used NMR to study the carbon chemistry of organic matter in a variety of forest ecosystems. This organic matter includes litterfall, woody debris, organic residues in various soil horizons, and dissolved organic carbon. Following the transformations of organic carbon as it moves through a forest ecosystem is an extremely important step in understanding ecosystem functioning, and is information required to be able to build defensible models.

Recently Dr. Preston put the NMR to work on chronosequential studies in old-growth coastal rainforests and second-growth stands. In the old growth, samples were obtained of the large downed and decaying logs which are characteristic of B.C.'s coastal forests. In the younger stands, similar samples were taken of fallen logs of varying ages. NMR analyses of these samples showed how the composition of wood changes over time as logs decay.

In other second-growth studies, she is looking at soil horizons to try to explain why salal grows successfully on some regenerated sites, when tree seedlings on the same sites suffer growth checks when 5-8 years old.

NMR analysis revealed high levels of tannins both in the salal and in the organic soil horizons. Research has shown that tannins can reduce the biodegradability of organic matter, thereby diminishing the productivity of these soils. A study using NMR to look at the availability of phosphorus before and after harvesting to see how this affects seedling growth is currently underway.

In the future, Dr. Preston foresees using NMR in more studies within the Forest Ecosystem Dynamics program - and yes, she is continuing her crusade to make NMR a 'household' word in forest research.



Dr. Caroline Preston

Even as the facility was being established, she published a bibliography of over 450 references of NMR studies with potential or actual application to forest research. She has since authored and co-authored numerous reports and journal articles on the subject. Recently, Dr. Preston's efforts were recognized. She received the prestigious Barringer Award, for her outstanding work in developing and applying NMR and other analytical techniques to Forest Ecosystem Dynamics research. Her Barringer Award Lecture paper, 'The NMR User's Guide to the Forest', appears in the latest edition of the Canadian Journal of Applied Spectroscopy.

Working out the bugs in yew research

“Scientists at Pacific Forestry Centre are ideally positioned to contribute to the sustainable development of taxol.”

Notions of the values of our forests are changing. Biodiversity, old-growth, rare species and medicinals are now counted among the assets contained in the forests of the Pacific Northwest. It is within this context that the discovery of taxol, a promising anti-cancer drug obtained from native Pacific yew trees, has provided a challenge to develop this new forest product while conserving the source of the raw material.

Scientists at Pacific Forestry Centre are ideally positioned to contribute to the sustainable development of taxol. Pacific yews are found in many diverse and apparently stressful environments on Vancouver Island and in coastal and interior British Columbia. Questions about the distribution of natural stands and the potential impacts of utilization and management led Dr. Al Mitchell to begin to investigate how Pacific yew would respond to disturbances.

The first discovery Al made was that virtually no studies had been conducted on the growth and biology of Pacific yew. Of over 300 articles surveyed, only four pertained to its ecology and distribution. His reaction was to collect branches and

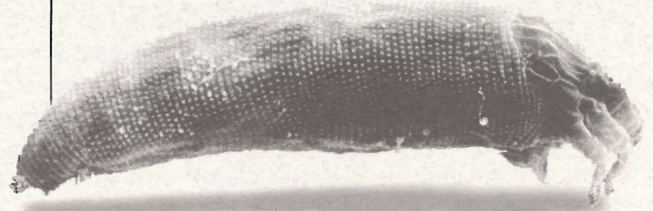
seed to try and propagate Pacific yew for experimental investigations. What happened next can only be attributed to serendipity.

While branch material was being prepared for vegetative propagation, Dr. George Edwards, a seed specialist, noticed that many of the buds destined to develop into seed were badly deformed. This caught the attention of Bob Duncan, a biologist with the Forest Insect and Disease Survey. He identified the cause of the problem as a microscopic mite with a macroscopic name – *Cecidophopsis psilaspis* –

commonly called the yew big bud mite. It was soon discovered that 90 percent of the buds of all native yews from Vancouver Island were infested! Could the mites be an introduced pest now colonizing all natural stands of Pacific yew? Fortunately, Dr. Val

Marshall, an expert on the biology of mites, volunteered to assist in our investigation. He confirmed that the mite was the same species found in European yews and suggested we map its distribution and track its life cycle. With the cooperation of Dr. Allan van Sickle and the Forest Insect and Disease Survey rangers, yew samples from all over British Columbia were collected and screened. Indications were that the mite was absent from interior populations, and raised questions about the susceptibility of those stands to infestation.

But could the mites be beneficial? Branches were evidently distorted, but the trees remained healthy, producing seeds and pollen and growing vigorous new branches. If taxol is produced as a defense compound, perhaps the mites stimulate its production. This remains to be seen, but PFC researchers Dr. Caroline Preston and Dr. John Manville are interested in the question.



yew big bud mite (*Cecidophopsis psilaspis*)

While these large-scale studies continued, Marilyn Clayton was conducting investigations of another dimension. Marilyn is a Research Technician with a talent for producing pictures that are worth thousands of words. Armed with a scanning electron microscope and a healthy dose of ingenuity, she set about to put a face to the yew big bud mite.

The tiny critters proved so difficult to handle that they escaped ultrafine mesh holders and vanished into minute crevices in the walls of specimen containers. With perseverance and patience, including coaxing the camera-shy mites out with a single-hair paintbrush, Marilyn succeeded in obtaining the first detailed photographs of the mite ever produced.

The success of this project is evidence of the synergy that can be generated when people of diverse backgrounds contribute a little of their time to a common goal. For more information about taxol and Pacific yew, contact Dr. Al Mitchell at Pacific Forestry Centre.



Dr. Al Mitchell and Marilyn Clayton

front cover: male yew bud
back cover: female yew bud
SEM photographs by
Marilyn Clayton

Environmental forestry heads the list

“R & D Update has been developed to put the results of our research in your hands as quickly as possible.

In a questionnaire included with our mailing-list update form last April, we invited you to tell us which forest-related topics you are interested in reading about. Environmental forestry topped the list with forest renewal and silviculture coming in a close second. The graph pictured here shows how you answered. We look forward to continuing to provide you with articles on subjects that interest you.

We're listening!

A significant number of you also said you'd like to see more tech transfer publications. Well, we've taken your advice. R&D Update has been developed to put the results of our research in your hands as quickly as possible. The format is well-suited for busy people with little time to spare for reading. Each R&D Update provides a one or two-page summary about a new technology that may be useful to you. We hope to give you just the right amount of information to keep you up-to-date on new technologies. If you wish to put the technology to use and require more information, it's just a phone call or letter away.

The following titles have been produced so far:

U.S. product puts fire effects knowledge at your fingertips

An introduction to the Fire Effects Information System (FEIS), a “new generation” user-friendly and menu-driven knowledge management tool developed by researchers at the U.S. Forest Service that you can access from your home or office computer.

Management of the black army cutworm

Contains suggestions for managing this defoliator, how to identify and monitor susceptible sites and how to conduct ground surveys.

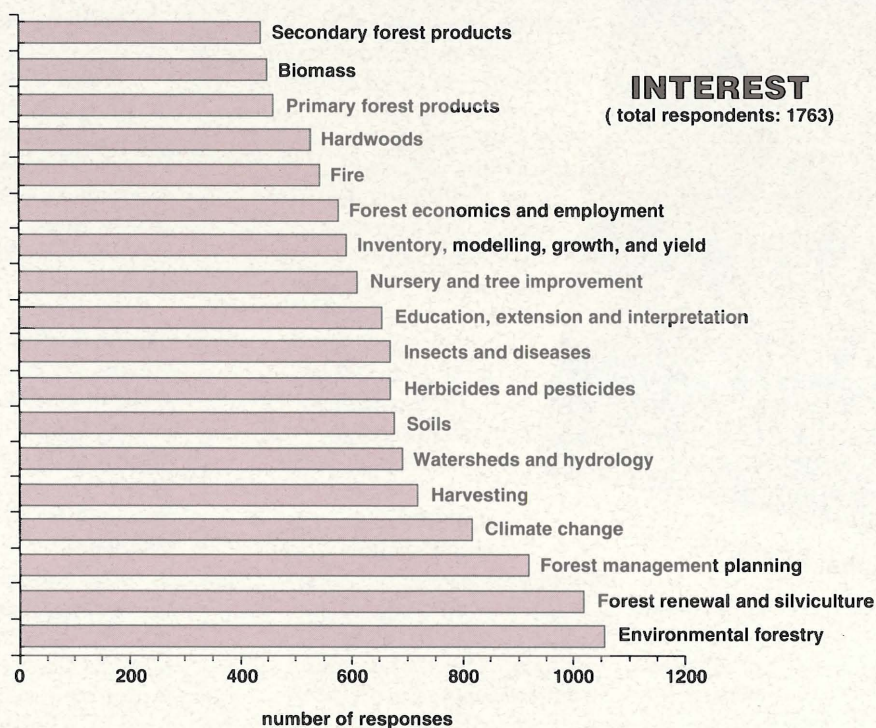
Join STROBINET: the electronic white pine/spruce weevil R&D network

Learn how you can join STROBINET, an electronic network linking scientists, practicing pest managers, and students working on the biology and control of the white pine spruce weevil.

Keithia leaf blight of western red cedar

Recommends methods to manage this serious nursery disease.

If you have not already received these Updates but would like to do so, please drop us a line or give us a call.



Pushover logging roots out Armillaria

In a dry, Douglas-fir ecosystem, about one in every ten trees was found to be infected with Armillaria root disease prior to selective logging.

Last year U.S. newspapers declared in bold headlines that a giant organism – the largest known to man – had been discovered beneath the ground in a Michigan forest. Shortly afterwards, this fifteen-hectare size record was shattered by another species of the same organism occupying several hundred hectares of Washington State. Residents of both areas breathed a little easier only after being reassured that despite its size, the creature posed no risk to human beings. The organism, a fungus called Armillaria, is however a serious threat to forests.

Armillaria fungi cause root disease in many trees and shrubs world-wide. Close to home, it poses a very real threat to the coniferous forests of southern British Columbia. In undisturbed forests, a natural equilibrium exists between trees and the fungus. This equilibrium is often upset by forestry practices such as selective logging. When this occurs, the remaining trees often fall victim to Armillaria root disease. Dr. Duncan Morrison, a forest pathologist with the Canadian Forest Service, is investigating how these practices affect levels of this disease.

Dr. Morrison notes that in dry, Douglas-fir ecosystems, about one in every ten trees harbours Armillaria root disease prior to selective logging. After logging, nearly half are infected. The numbers are even more startling in moist, mixed-conifer ecosystems where the pre-harvest infection rate of 80 per cent rose to nearly 100 per cent after selective logging.

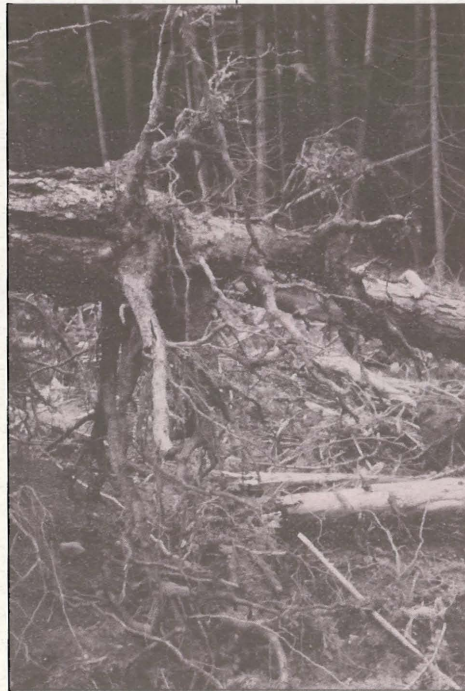
The roots of large stumps are the source of the fungus. If left in the ground after selective logging, stumps and roots of cut trees are quickly colonized by Armillaria. In time, the fungus spreads to surrounding healthy trees, killing them or reducing their growth. But

when stumps are removed from the ground, opportunities for infection of other trees are minimized and major problems will not occur as the stand ages. Once on the surface, says Dr. Morrison, the diseased stump and root system pose no danger to the surrounding forest.

The task now is to convince forest companies to remove the stumps as well as the stems during harvest. Dr. Morrison advocates a method known as pushover logging as an effective way of removing diseased stumps from the ground. However, pushover logging entails additional costs, something foresters – even those impressed by Dr. Morrison's findings – are not keen on absorbing.

But according to Don Norris, a pathologist for the B.C. Forest Service's Nelson Forest

Region who has pioneered the use of this method for prevention of root disease, companies can gain 15 to 20 per cent more volume from the same piece of ground than they can using conventional logging methods. With pushover logging, stumps can be cut one to two feet lower when they are out of the ground and there is better utilization of small diameter trees. The additional volume would more than offset the cost of stump upheaval.



Once on the surface, says Dr. Morrison, the diseased stump and root system pose no danger to the surrounding forest.

Year one for Sustainable Forests: A Canadian Commitment

“In March 1992, Canada became the first forest nation to create a broad commitment to the development of sustainable forests nation wide.”

In March 1992, Canada became the first forest nation to create a broad commitment to the development of sustainable forests nationwide to meet the concern for the future of our forests. Through a national forest strategy, “Sustainable Forests: A Canadian Commitment”, the Canadian Council of Forest Ministers (CCFM) established nine specific strategic directions, 25 objectives and over 90 commitments to guide the policies and programs of Canada’s forest community over a five-year period.

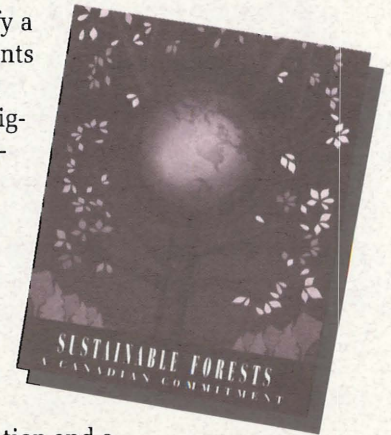
At the same time, CCFM ministers, representing the provinces, territories and federal government, signed the first Canada Forest Accord.

Now after the first year, a coalition of the Accord and Forest Strategy signatories established to monitor progress in implementing the strategy, has reviewed the achievements and issued its first report. Under each of the nine strategic directions, the Coalition has

been able to identify a range of achievements and activity among governments, Aboriginal peoples, academia, business, labour, industry, private woodlot owners, environmental groups and other non-governmental organizations.

Further information and a copy of the Coalition’s report is available by contacting:

National Forest Strategy Coalition,
Hull, Quebec, K1A 1G5
telephone: (819)997-1107
fax: (819)953-7048.



Staff Comings & Goings

Elaine Teske has been appointed to the position of Acting Director of Forest Development for the Pacific and Yukon Region. In this role, she will oversee the delivery of five major targeted forestry programs: the Canada-British Columbia Partnership Agreement on Forest Resource Development: FRDA II; The Canada-Yukon Cooperation Agreement: Forestry Development; The South Moresby Forest Replacement Account; and the Canadian Forest Service’s two Green Plan initiatives, Model Forests and Tree Plan Canada.

Mrs. Teske will be familiar to many from her fourteen years in the region, first as Regional Communications Manager and later Director of Communications and Extension.

Lorraine Blashill has been named Acting Director of Communications and Extension for this region. Mrs. Blashill is responsible for managing editorial and pub-

lishing services, public and media relations, and creative services for the C.F.S. in the Pacific and Yukon Region. She is also responsible for developing and implementing communications plans and strategies for all of our major regional programs as well as providing communications support for national programs.

Lorraine Blashill joined the C.F.S. in 1991 as an Information Officer responsible for FRDA communications and later became Head of Communications for the region. Prior to joining the C.F.S., Mrs. Blashill worked for six years with the National Research Council in Saskatoon. In the course of her career, she has worked in advertising; radio, television and newspaper journalism; and as a freelance writer. Her writing credits include over 150 business and science articles for regional, national, and international publications; five non-fiction books; and numerous stage and radio plays.



Elaine Teske

Natural Resources Canada and the Canadian Forest Service

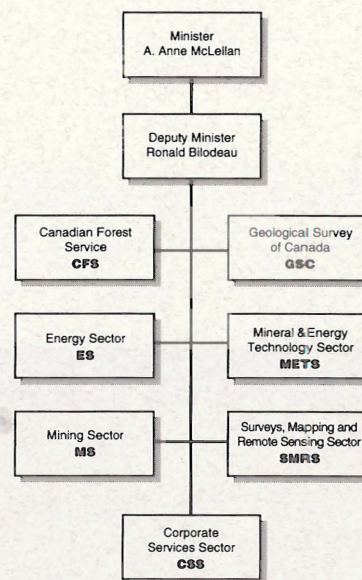
Last June, the Departments of Forestry and Energy Mines and Resources were combined to form what will become the new Department of Natural Resources Canada (NRCan). The department comprises several sectors: forestry; energy; mining; surveys, mapping and remote sensing; mineral and energy technology; and geological survey. The forest sector is now known as the Canadian Forest Service.

The Minister Designate of Natural Resources Canada is Anne McLellan, M.P. for Edmonton Northwest. She was elected to the House of Commons in October last year. Born in Nova Scotia, Ms McLellan was a professor of Law at the University of Alberta and served on the board of directors of the Canadian

Civil Liberties Association and of Alberta Legal Aid. She is a well-known local and national commentator on the Charter of Rights and Freedoms and related constitutional topics.

Our Deputy Minister Designate, Ron Bilodeau, was appointed Deputy Minister of Energy, Mines and Resources in February 1993. Prior to this appointment, Mr. Bilodeau held senior positions in the Office of the Privy Council, Treasury Board, and Economic Development. Former Deputy Minister of Forests, Jean-Claude Mercier, has been named Special Advisor to Mr. Bilodeau.

Dr. Yvan Hardy, formerly Forestry Canada's Assistant Deputy Minister of Operations, has been appointed Assistant Deputy Minister of the Canadian Forest Service.



Recent Publications

Impacts of biomass harvesting on soil disturbance and surface soil erosion at Seller Creek in interior British Columbia

P.R. Commandeur and
M.E. Walmsley

Documents the impacts of biomass harvesting by rubber-tired skidders on soils, namely soil disturbance and surface soil erosion.

BC-X-342

Dynamic programming: a tool for financial analysis of stand management regimes

William A. White

Dynamic programming is used to determine the optimal management regime for a stand of coastal Douglas-fir.

BC-X-343

Forestry Canada Modelling Working Group: Proceedings of the Seventh Annual Meeting and Workshop, Pacific Forestry Centre, Victoria, B.C. February 1993

compiled by G.M. Bonnor

A compilation of technical papers, model demonstrations, poster presenta-

tions, and establishment reports presented to participants at the Seventh Annual Meeting and Workshop of the Forestry Canada (now C.F.S.) Modelling Working Group held in Victoria, B.C. from February 8-9, 1993.

Dormancy and barriers to germination – Proceedings of an international symposium of IUFRO Project Group P2.04-00 (Seed Problems)

compiled and edited by
D.G.W. Edwards

A compilation of papers presented to participants at the international symposium of IUFRO Project Group P2.04-00 held in Victoria, B.C. from April 23-26, 1991.

Forest Insect and Disease Conditions in Canada 1990

compiled by B.H. Moody in cooperation with officers of Canadian Forest Service establishments

Provides quantitative and interpretive data on damage and depletion caused by forest pests in Canada during 1990. Compiled from regional FIDS surveys.

Canada-Yukon Cooperation Agreement – Forestry Development (1991-1996) 1992-1993 Annual Report

Reports the achievements, activities and expenditures of the Canada-Yukon

Cooperation Agreement – Forestry Development during the 1992-1993 fiscal year

Model Forest Program Year in Review 1992-1993

Reports the highlights and progress of the Model Forest Program during the 1992-1993 fiscal year.

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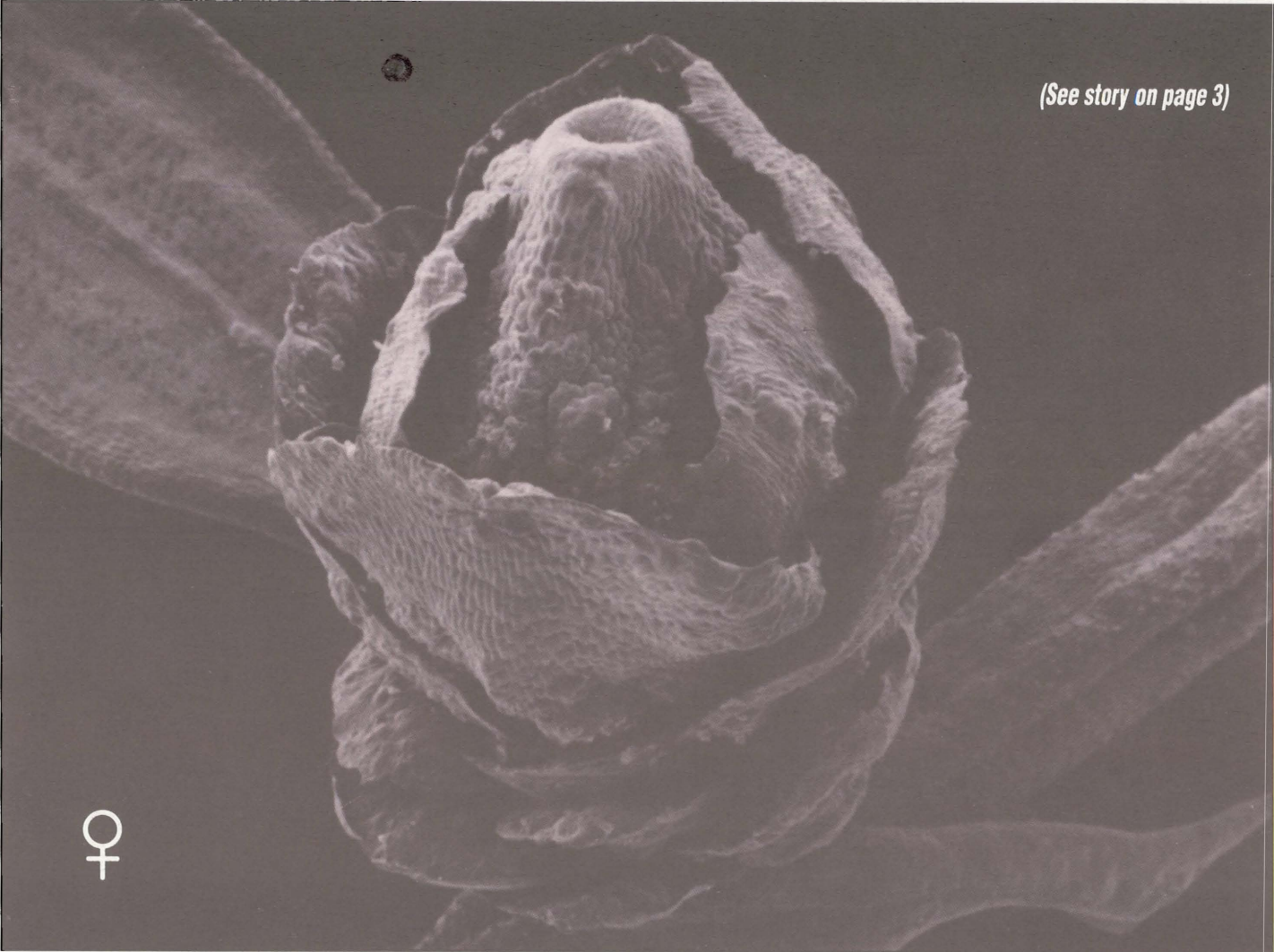
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INFORMATION FORESTRY



(See story on page 3)

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