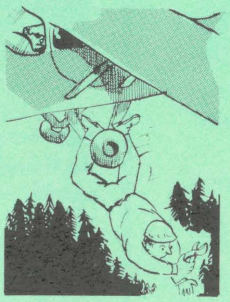
JULY, 1972
Volume 1, Number 2

INFORMATION Forestry
PACIFIC FOREST RESEARCH CENTRE, VICTORIA, B.C.
ENVIRONMENT CANADA FORESTRY SERVICE

WHEREFORE ART THOU LITTLE FOREST PEST?

The annual inspection of forest insect and disease conditions in British Columbia is well underway by survey crews of the Pacific Research Centre, Victoria. Alex Molnar, head of the survey group, reports that major defoliators, bark beetles, dwarf mistletoes and root rots will receive special attention this season.

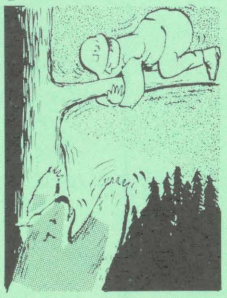
Major objectives are to measure population trends of insects, obtain an estimate of insect and disease damage, and determine the impact of natural controls. Surveys are undertaken in collaboration with the B.C. Forest Service and industrial foresters.



Early season efforts will include larval sampling for defoliator insects in areas determined by last season's ground and aerial observations. The black-headed budworm on Vancouver Island, the spruce budworm in the Pemberton-Lillooet area, and the larch casebearer in the Nelson Forest District are defoliators receiving intensive study.

The mountain pine beetle in the Interior Wet Belt and an outbreak of the spruce beetle, west of Kelowna, are the ones being assessed by aerial surveys supported by a limited number of ground samples.

In addition, the survey group will continue to provide a diagnostic and taxonomic support service for field crews and representatives of the Forest Service and industry requiring identification of forest pests. Detailed studies defining the impact of insects and diseases affecting primarily tree growth are being assessed, using dwarf mistletoe, black-headed budworm and spruce budworm as test organisms.



Personnel are also studying methods of improving survey techniques, particularly the improvement and greater use of aerial photography as a tool in detecting and appraising forest damage. A special hazard index is being developed to help overcome the costly time-lag in the detection of spruce beetle outbreaks.

FIRE – 1972
NEW TECHNIQUES TRIED

A new airborne fire monitor will be among projects tested this summer by fire researchers of the PFRC. Designed to seek out and record wildfires, the new apparatus consists of an infra red camera mounted on a Cessna Skymaster aircraft. Infra red imagery is recorded on magnetic data tape at known intervals, and played back through a color monitor. When referenced with standard photographs, the rate of spread and energy of emerging fires can be related to extrapolated index values. Working out of Kamloops, the researchers hope to acquire objective fire behaviour information from fires in undisturbed forest stands; in the past, this data was almost impossible to obtain.

Other projects underway for improved prediction of wildfire behaviour include:

- Final phase of relating frequency and size of man-caused and lightning fires to Fire Weather Index calculated at 20 weather stations, using 10 years of weather data and information from 18,000 fires. Resulting guide will be used for initiating prevention and suppression activities.
- Studying ignition probability in spruce and lodgepole pine types from simulated neglected campfires and discarded matches. This will provide guidelines for imposing fire restrictions in areas of high recreational use.

Studying the use of electronic packages, and other recently developed techniques to monitor operational prescribed burns is another new project for 1972. Special thermal regulators will be planted in prescribed burn areas to monitor the rate of spread and thermal impulse. The information will be used to provide burning guidelines for coastal hemlock-balsam forest types and to supplement data in cedar-hemlock types. A new fire weather station and photographic fuel inventory system will be used during the study.

SURVIVAL OF HEMLOCK SEEDLINGS

Root development of newly germinated hemlock seedlings is under study by investigators of the PFRC in an effort to reduce the high losses encountered when using bare-root hemlock nursery seedlings in this province's reforestation program.

root growth

Improvements are being achieved with the introduction of container grown seedlings, but there remains the problem of obtaining adequate root growth to consistently ensure the survival of seedlings. Scientists believe that survival and vigor are directly related to root development. Seedling quality is also important and can be enhanced by fertilization, root pruning and transplanting.

Since 1969, Dr. George Edwards of the resources research group, has studied factors governing root growth and means of preconditioning the newly germinated hemlock seedlings for maximum root growth at the time of transplanting in the field. Environmental factors such as light intensity and quality, combinations of light and dark periods, temperatures (especially differential root/shoot temperatures), moisture conditions, the effects of fertilizers and possible chemical stimulants are being studied.

soil mix

Preliminary results show that the soil mix has a considerable influence on the size of the seedling root system. A peat-vermiculite mix gives bigger, heavier plants with longer, heavier root systems with many more branches and greater surface areas than a sand-peat mix.

cold treatment

Increases in the amount of root growth in transplanted seedlings (up to 15 times in length and 9 times in number of roots) have been obtained following exposure to periods of low temperature prior to lifting. Fertilizers do not appear to have much direct influence on root growth, but recent tests indicate that root regeneration in transplanted seedlings might be improved by high doses of fertilizer applied at the right time.

germination studies

An accompanying study on germination requirements shows that seed origin, seed size and pretreatment are also important in the early stages of the seedling. Hemlock germination responds to light; however, too much and too little light actually depresses germination rates. Results indicate that western hemlock seeds should be covered with soil after sowing in the nursery to prevent exposure to light. Effects become more significant at temperatures in excess of 20° (68°F).

Stratification has also been shown to be effective on germination rates. Although at least 2 - 3 weeks' treatment is required for a gain of 2 - 3 days in germination rate, longer periods of stratification can be very beneficial. For instance, if seeds are stratified for four months, 90% germination can be obtained 10 days after sowing, whereas unstratified seeds take 24 days to reach 90% germination. Since visible signs of hemlock germination take at least 6 days, a method of pregermination (laboratory incubation of the seeds at 20° in the dark) for 5 days, then sowing outdoors on the sixth day, was tested. Over 90% of the seedlings became established in 2 - 3 weeks, whereas seeds not pregerminated required almost two months.

The effects of chemicals such as soil wetting agents, rodent repellents, are also being studied and attempts are progressing to develop a rapid method of determining hemlock viability.

NEW CFS FILM

SMALL SMOKE AT BLAZE CREEK
(Colour: Sound: 8 mins.)

An award winning film depicting causes and dangers of forest fires. Copies available from the PFRC.

NEW DIRECTOR — PFRC

Mr. M. H. 'Mike' Drinkwater is the new Director of the Pacific Forest Research Centre, Victoria, replacing Dr. Thomas who left Victoria in March of this year to become Director General of the CFS in Ottawa.

A native of Kelowna, B.C., Mr. Drinkwater joined the CFS in 1949 after graduating from the University of New Brunswick with a Bachelor of Science degree in Forestry. He served in the Maritimes until 1960 when he became senior research officer and district forest officer for the Alberta region. He was Associate Director from 1965-69, and for the past three years was Director of the Northern Forest Research Centre in Edmonton.

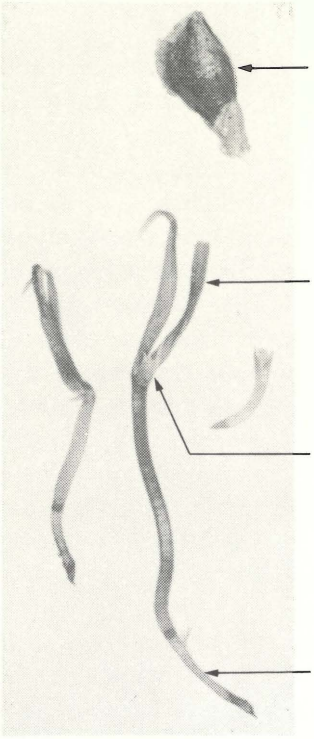
Mr. Drinkwater is married, has two sons and is a member of the CIF.

HEADS ALBERTA CFS

Dr. G. T. 'Tom' Silver, Associate Director of the Pacific Forest Research Centre since 1965, has been appointed Director of the Northern Forest Research Centre in Edmonton, which services the three prairie provinces and the Northwest Territories.

A graduate of the University of New Brunswick, Dr. Silver holds M.Sc. and Ph.D. degrees in forest entomology from Syracuse University.

Well known in forestry circles in B.C., Dr. Silver has served with the federal forestry service in the province for the past 19 years.



DOUGLAS-FIR TRIPLETS

Although multiple embroys are not uncommon in conifers, mature seed seldom yields more than a single seedling. All other embryos are repressed during development, an extraordinary example of early natural selection of a more vigorous embryonic unit. In a recent germination test at the PFRC, three separate embryos were observed growing from a single seed (A). Unfortunately the seedlot was treated with a chemical which proved unfavorable for seedling growth, eliminating the plant from further study.

FIELD HEADQUARTERS OF INSECT AND DISEASE SURVEY RANGERS

Vancouver F.D.:
Roly Wood — P.O. Box 43, Sardis, B.C.
Phone 858-4472
Peter Koot — 506 W Burnside, Victoria, B.C.
Phone 388-3811

Prince Rupert F.D.:
Dick Andrews — P.O. Box 23, Terrace, B.C.
Phone 635-7660
Bob Erickson — P.O. Box 2259, Smithers, B.C.
Phone 847-3174

Kamloops F.D.:
Cliff Cottrell — P.O. Box 986, Vernon, B.C.
Phone 542-2726

Cariboo F.D.:
Don Doidge—P.O. Box 2254, Williams Lake, B.C.
Phone 392-6708 or 376-3079

Nelson F.D.:
Ernie Morris — P.O. Box 7, New Denver, B.C.
Phone 358-2544
Jack Monts — P.O. Box 120, Wasa Lake, B.C.
Phone 422-3424

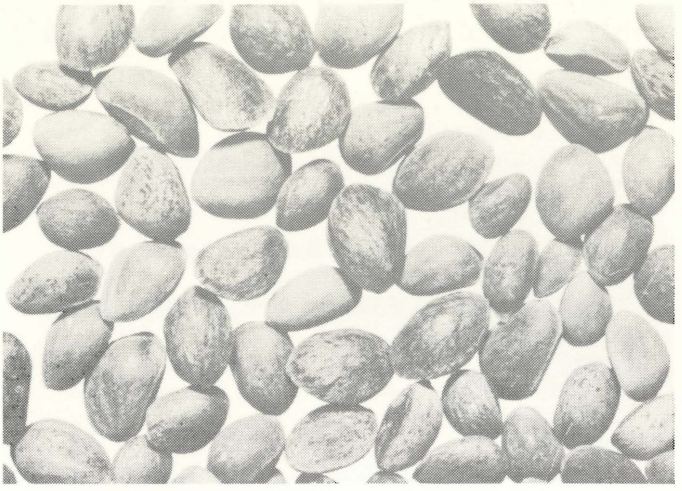
Prince George F.D.:
Stan Allen and Colin Wood—
P.O. Box 687, Prince George, B.C.
Phone 963-7238

Inquiries regarding pest outbreaks may be directed to the above contacts or to the:

FOREST INSECT AND DISEASE SURVEY
Pacific Forest Research Centre
506 West Burnside Road
Victoria, B.C.

MR. PAUL BRETT assumes new duties as head of a *Forestry Services Group* at the PFRC. The section brings together the Liaison and Development Group and the Amelioration Group which at present includes a silviculturist, ecologist and a forest hydrologist.

PONDEROSA PINE SEED



EXPORT OF TREE SEED

The recent adoption by Canada of standards for the international movement of forest tree seed has enabled B.C. exporters to retain major European markets.

A decision by large importers in Great Britain, Denmark and West Germany to buy only certified seed resulted in exporters approaching the Federal Government to establish standards for the export of Canadian seed. In 1970 a scheme was accepted by O.E.C.D. whereby the Canadian Forestry Service would handle arrangements for certification. Responsibility, in respect to seed collected in B.C., was delegated to the Pacific Forest Research Centre, Victoria.

The chief objective of the program is to ensure that buyers receive authentic information about the source and origin of the material sold. The present standards being enforced deal with source identification of tree seed, who is collecting the cones, how they will be transported, and location of extraction plants.

Rules apply to seed intended for export and not domestic use, and that certification is required before the seed is exported.

Anyone interested in the scheme should contact the Director, PFRC, 506 West Burnside Road, Victoria, B.C. Information Report BC-X-60 contains comprehensive details on the operation of the program.

HIGH LEVEL PHOTOGRAPHY

Colour photographs taken from high flying CF-100 jet aircraft may prove valuable in detecting and appraising forest pests in British Columbia, according to research personnel of the PFRC.

Exploratory studies show that damage caused by insects such as the western hemlock looper is visible on small-scale, colour and false-colour photographs. Recently a Canadian Forces jet, flying at a height of 40,000 feet, covered the southern portion of the province. Inaccessible and extensive areas were covered; although 1 inch on the photographs represented 2½ miles on the ground, individual trees were discernible. Skilled interpreters could quickly detect and estimate the extent of the insect and disease problem. Where control measures recommend aerial spraying, the photographs will aid pilots in identifying and thus avoiding areas such as streams, rivers, logging operations and private land.

Salvage of infected timber can be hastened, with exact boundaries of the damage being transferred to maps for use by the Forest Service and logging companies. Tree mortality is generally unforeseen when logging plans are drawn up and changes are facilitated if accurate information is available.

Along with continuing this study, scientists will test smaller satellite photographs to determine if they can be used to improve the surveillance of forest pests in B.C. A variety of remote sensing devices, including cameras, filters and films will also be tested during the next few years.

Forest pest surveys are presently carried out by experienced CFS insect and disease survey officers working in liaison with Forest Service and industry personnel. In most cases, observations are made from the ground or from low flying aircraft.

Pacific Forest Research Centre
Canadian Forestry Service

506 West Burnside Road
Victoria, B.C.

IF YOU WISH TO RECEIVE A COPY(IES) OF THE FOLLOWING REPORTS
PLEASE NOTE AND RETURN

FOREST PEST LEAFLETS:

No. 39—"Common Needle Diseases in British Columbia" by L. S. Unger.

No. 40—"Pine Needle Scale and Black Pineleaf Scale in British Columbia" by R. O. Wood and D. A. Ross.

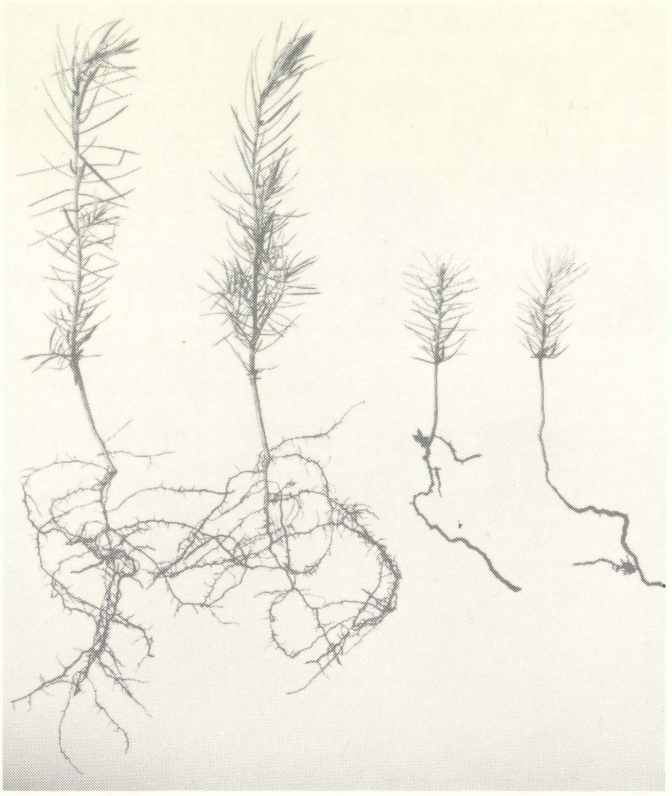
No. 41—"Needle Rust of Lodgepole Pine" by Daphyne P. Lowe.

No. 43—"Pine Needle Casts in British Columbia" by D. G. Collis.

No. 45—"Needle Rusts of True Firs in British Columbia" by N. G. Bauman and E. Wegwitz.

No. 46—"True Fir Needle Blights in British Columbia" by A. T. Foster.

Info. Rept. BC-X-66—"The Levels-Of-Growing-Stock Co-operative Study in Douglas-Fir in British Columbia" by P. K. Diggle.



HEALTHY DISEASED

CORKY ROOT CLOBBERS SEEDLINGS

More than 1.3 million Douglas fir seedlings in coastal Forest Service nurseries have been seriously damaged during the past 3 years by a root-destroying nematode. In 1971 alone, several hundred thousand one-year-old Douglas fir seedlings were ruined at the Campbell River Nursery on Vancouver Island.

A worm-like creature, the nematode *(Xiphinema bakeri)* causes corky root disease by feeding on the root cells of the seedlings, gradually weakening the plant to the point where it is no longer usable. The disease is confined to coastal nurseries and is most severe on Douglas fir, although other species are attacked. Diseased spruce and hemlock seedlings usually frost-heave during the first winter.

Although corky root has been a problem in British Columbia since 1963, it is only recently that exceptionally large quantities of seedlings have been destroyed. The increased loss is largely the result of continual cropping of nursery areas brought about by boosting production to meet increasing demands for seedlings. This has allowed nematode populations to build up to damaging levels.

Dr. Jack Sutherland, a pathologist with the PFRC who has studied the problem in detail, reported recently that bare fallowing accompanied by frequent discing on hot summer days has a detrimental effect on nematode populations. The combination of hot dry soil and lack of food supply causes high nematode mortality. Forest Service officials use this control procedure as it is compatible with a nursery practice now used to control weeds. Also effective is preplant application of D-D nematicide.

CURRENT RESEARCH PROGRAM includes studying the life cycle of the nematode and the numbers required to damage various tree species. The results will establish the ideal time to apply controls and determine if seedling rotation can be used as another means of control.

In addition, the PFRC will continue to provide an advisory service to the B.C. Forest Service in checking seedlings, soil and amendments for disease and nematodes, making a post-treatment evaluation of controls, and movement of transplants within nurseries.

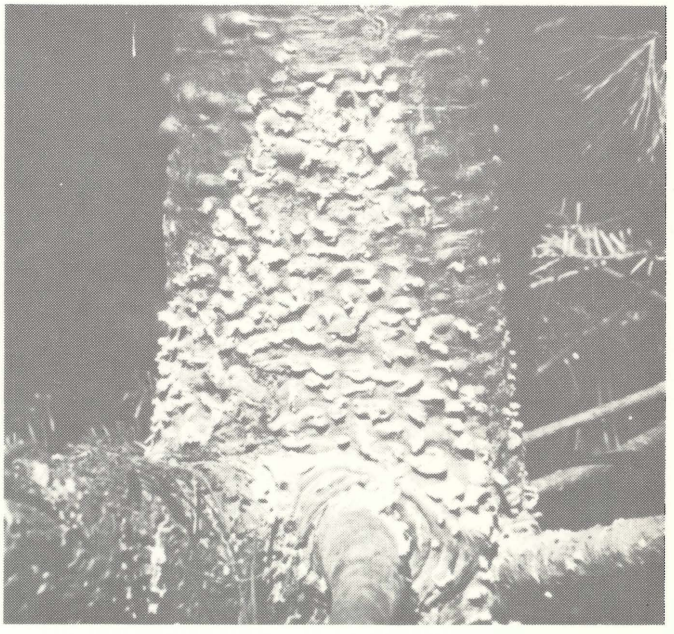
PURPLE MOULD AIDS WHITE PINE

Western white pine, long regarded as a valuable species an account of its great form, fast-growing characteristics and its variety of uses, has been under stress in British Columbia for more than 50 years because of the white pine blister rust. This forest disease causes annihilation of complete pine stands and a high mortality among regeneration. Damage varies greatly; entire stands on the coast have been wiped out, while some interior stands have escaped with only light infection.

Studies underway by pathologists of the PFRC should assist the forest manager in understanding the cause of the variation of this fungus. Climatic factors and local fluctuation of spore concentrations will also be investigated. Special attention will be given to activities of the PURPLE MOULD, *Tuberculina maxima,* a so-called hyperparasite that can infect blister rust cankers, stopping further spore formation. Evidence shows that the mould can cause complete canker inactivation. Although classified as a hyperparasite, studies indicate that it actually acts by inducing a change in the canker which in turn affects the rust.

A recent survey found purple mould in many locations in the province, but not in every stand of western white pine. It occurs on several native rusts but it is not known if there are special strains which only affect the blister rust. Studies of the biology of the purple mould should determine its effectiveness as a biological control agent.

Another closely related study involves the value of retaining tree cover along stream banks where the alternate host for the rust tends to grow. Scientists believe that leaving strips along waterways helps to suppress alternate hosts, such as wild gooseberries, and thereby reduces the chance of the disease being transmitted.



INSECTS & DISEASE CONDITIONS — 1972

To ensure that forest managers in this province are informed of present insect and disease conditions, the Canadian Forestry Service maintains a comprehensive detection and appraisal program. Last season PFRC survey crews collected more than 7000 insect and disease samples.

Insect Conditions

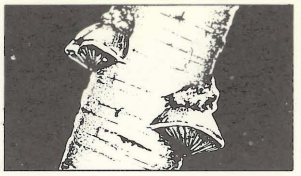
Results showed that black-headed budworm defoliation of western hemlock on Vancouver Island increased from 2,500 acres to 160,000 acres. Egg surveys in the Fall indicated an intensification of the damage that may be expected. Although serious mortality is unlikely, light tree kill and dieback of seriously defoliated trees may occur this year.

The one-year-cycle spruce budworm continued to cause heavy defoliation, particularly of the Douglas-fir in over 35,000 acres in the Pemberton-Lillooet area. A number of new outbreaks in Douglas-fir stands were found along the Fraser River south of Boston Bar and near Hope. A close relative of this budworm caused heavy defoliation of white spruce and alpine fir along the Alaska Highway between Liard Hotsprings and Fireside. There was a local outbreak of western hemlock looper in the North Vancouver area and an extension of the larch casebearer outbreak northward in the western larch stands of the West Kootenays.

Surveys indicated that most bark beetle losses were below average levels. The notable exception was the mountain pine beetle which caused a sharp increase in mortality of western white pine in the Interior Wet Belt and in lodgepole pine stands in the Kootenays. The spruce beetle, responsible for heavy losses in Engelmann and white spruce in the Nelson and Prince George Forest Districts in the late 1960's, was at low levels except for a new outbreak in the Barton Hills area west of Kelowna. Losses from other insects continued to take their annual toll.

Disease Conditions

The most severe losses from disease organisms are attributable to decay fungi, mistletoe diseases and root rots.



Major emphasis in disease surveys is directed toward an assessment of the growth impact of dwarf mistletoes of western hemlock and lodgepole pine. Studies are underway to develop mistletoe survey procedures suitable for practical application by non-specialists to improve the accuracy of forest inventories for forest management decisions.

FORESTRY GRANTS

The forestry faculties at the Universities of British Columbia, New Brunswick, Laval and Toronto will share in $192,000 federal forestry grants. Each will receive $48,000, a 20% increase over last year. Grants will be used to provide bursaries, support technical personnel and purchase research equipment. The funds increase opportunities for forestry research at the university level, and enable from 10 to 20 students to undertake post-graduate training at each establishment.

In addition, extra mural forestry grants totalling $100,000 have been awarded to 19 professors at 10 Canadian universities. More than $31,000 to the staff at the University of British Columbia.

Grants are made under the Canadian Forestry Service's policy of aiding research related to problems of managing Canada's forests and the utilization of their products.

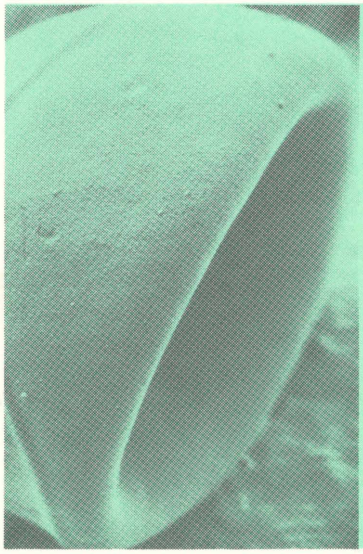
Projects at the University of B.C. are:

O. Sziklai—$8,500 to provide fundamental information for the development of tree breeding programs to achieve maximum fibre yield in B.C.

D. D. Munro—$3,600 to procure and evaluate various kinds of remote sensing imagery for renewable resource management.

D. S. Lacate, R. P. Wellington, and L. Adamovich—$9,300 to evaluate and develop new guidelines for the location, design and construction of forest access roads for multi-purpose resource management.

J. H. G. Smith—$10,000 to analyse and improve initial attack systems for forest fires.



DOUGLAS-FIR FEATURED

The Canadian Forestry Service has just published a major work on the LIFE HISTORY OF DOUGLAS-FIR—by G. S. Allen and J. N. Owens. 139 pages. Gratis.

Anyone interested in the business of forestry should read this book. It is a well-written documentary embracing the major factors of the entire life cycle of Douglas-fir, from the initiation of seed and pollen cones to the shedding of mature seed.

The book is generously illustrated with excellent color and black and white photographs, showing the various stages of the reproductive cycle of Douglas-fir.

Copies may be obtained by contacting the PFRC.

ENVIRONMENT CANADA
HON. JACK DAVIS, MINISTER

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