Jeff Burk

Province of
British Columbia
Ministry of
Forests and Lands

PEST MANAGEMENT PROGRESS

A summary of pest management activities in the British Columbia Ministry of Forests and Lands.

Volume VIII, Number 1 (File 190-4 PMP) Spring 1989

Pest Management Reports and Publications

Over the past eight years, Protection Branch, in association with regional staff specialists, developed a comprehensive selection of reports and other documents.

The purpose of these is to facilitate communication and provide an understanding of pest management initiatives and accomplishments. This published (and unpublished) information base has been structured to (1) augment existing literature, (2) encourage Forest Service participants to contribute, and (3) provide factual details of operational guidelines and procedures.

Manuals and Handbooks: The recommended procedures and guidelines for forest pest management are contained in Volume II of the ministry's Protection Manual. Policy statements are contained in Volume III of the companion Policy Manual. Two special references have been provided on pesticide use and regulation -- the Ministry of Forests/Council of Forest Industries' "British Columbia Forest Pesticide Handbook" and the Forestry Supplement to the Ministry of Environment's "Handbook for Pesticide Applicators and Dispensers."

Reports: There are two series of reports on pest management: unpublished branch and regional office internal reports and the Ministry's refereed Pest Management Reports.

Extension Literature: The bulk of information on specific pests, procedures, and strategies is contained in the PesTopics series. These are brief, descriptive fact sheets designed to augment the Pacific Forestry Centre's "Pest Leaflets." As well, they assist Forest Service staff in demonstrations, displays, correspondence, and training. Special booklets dealing with bark beetles, disease management, and pesticide use provide background information and additional details of operations or procedures.

Write to Protection Branch (Attn: Ms. Pat Humphreys) for additional details regarding these publications and their availability.

- R.F. DeBoo, Protection Branch, Victoria.

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PEST MANAGEMENT PROGRESS

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PUBLISHER'S AND EDITOR'S NOTE

Pest Management Progress is intended to provide factual information on projects and proposals by Ministry staff.

Contributions labelled with an appropriate subject heading should be submitted to the Regional Protection Officer or Advisor who will edit and forward them to Protection Branch. PMP is submitted to the spring (May) and Winter (December) meetings of the B.C. Forest Pest Review Committee.

Authors should be contacted for any clarification as the contents of this report do not necessarily constitute official statements of the Ministry of Forests.

PEST MANAGEMENT GENERAL

Forest Health Strategy. Protection Branch Pest Management staff are proposing a change of name and shift in emphasis from pest management to forest health.

The underlying reason for the change is to state more clearly the benefits of appropriate management of forest and range pests.

A detailed program is being prepared.

- J. Dunlop, Protection Branch, Victoria.

Professional Pest Management Association of B.C. (PPMA). This well-established organization has seen significant growth during the past year. Membership now exceeds 110.

Benefits include a fine newsletter "Pesticulars" an excellent annual meeting and an opportunity to participate in the business affairs of the association.

Write to PPMA at P.O. Box 22190, Station B, Vancouver, V6A 3Y3 for information on membership.

- R.F. DeBoo, Protection Branch, Victoria.

Report on the Yellow Point Deliberations of 1988. A "think-tank" was held in May of 1988, to review the status of research and development on problems caused by pests in B.C. forests. The "think-tank" also considered the problems to be solved in developing a cooperative and coordinated R & D program. A report has now been prepared which summarizes the proceedings and copies will be available from the Protection Branch shortly (Forest Service Internal Report, PM-PB-40).

The participants at the "think-tank" were unanimous on the need to improve information bases and management practices relative to forest pests. However, the committee structure that would support and encourage these developments is lacking. Protection Branch will follow-up the workshop and prepare specific proposals for a Technical Advisory Committee which not only would be responsible for the programs within the Forest Service but also foster cooperative research and development programs which should include industry, universities and Forestry Canada. The overall purpose of this advisory committee as perceived by the "think-tank" would be:

- to increase awareness of the benefits from good pest management;
- to develop a strategic plan for research and development in this field;
- to do some of the lobbying necessary to gain support; and
- to link with the other working committees and organizations in the forestry sector.

- M. Shrimpton, Protection Branch, Victoria.

Forest Resource Development Agreement Pest Control Projects. Various reports on pest control project achievements under the Canada-British Columbia Forest Resource Development Agreement (FRDA) are included in this issue.

For 1989-90, similar projects are anticipated including root disease surveys, dwarf mistletoe assessments, root collar weevil surveys, leader weevil damage appraisals, and establishment or re-measurement of trials to control several important pests.

An overall evaluation of the five-year FRDA pest control program is planned for 1989-90.

- J. Muir, Protection Branch, Victoria.

Pest Risks at the Pre-harvest Silviculture Prescription. A draft report was prepared by region and branch Protection staff in February to outline expected risks from important forest pests in British Columbia. Thresholds of pest incidence that should be treated were proposed, along with suggested or recommended procedures for assessment and management.

The preliminary draft focused on disease problems, and important insect pests will be added. The suggested standards and procedures will be evaluated by regional and district staff in 1989, and guidelines will be formulated in winter 1989-90 for adoption by Silviculture and Protection Branch.

- J. Muir, Protection Branch, Victoria, and R. Winter, Silviculture Branch, Victoria.

Regeneration Surveys. A "Pest Identification in Silviculture Surveys" component (Section 17) was prepared for the Silviculture Regeneration Surveys course. Standards and procedures for major pests are presented, and a slide show illustrates features of the major pests.

- J. Muir, Protection Branch, Victoria, and R. Winter, Silviculture Branch, Victoria.

Bowser Demonstration Forest Root Rot Project. Protection Branch and Integrated Resources Branch are assisting Port Alberni Forest District in an applied pest management project in this demonstration forest near Parksville. Laminated root rot is present in second growth Douglas-fir stands. The area is being surveyed for incidence of the disease. Disease locations and data are being entered on the Geographic Information System. Integrated Resources Branch is helping to outline pest management G.I.S. software needs in integrated forest management.

- A. Mitchell, Integrated Resources Branch, Victoria.

Road Show Report. The Pest Management Seminar and Workshop has been presented to forestry personnel at Powell River, Sardis, Fort St. John, and Vanderhoof, and to B.C. Parks staff at Richmond during the past year. These presentations have permitted us to determine areas of interest and need, and to tailor presentations accordingly. After these fine performances, we believe we now have a very useful update/refresher session to offer.

The session (ranging from 4-7 hours) is intended primarily for professional and technical specialists working in allied disciplines, especially silviculture, timber management, recreation, planning, inventory and fire management. The seminar portion highlights basic concepts, organization, guidelines, and local activities or opportunities, while the workshop unit permits discussion, exchange of views and problem solving. In the Tabulations and Graphics section is a copy of the advertisement for this seminar and workshop.

Please contact the undersigned for more information.

- R.F. DeBoo, Protection Branch, Victoria.

Weevils and Other Forest Pests. Chapter 11, "Weevils and Other Forest Pests" was completed for the Protection Manual, Volume 2, Pest Management.

Section coordinators included R. DeBoo (weevils), P. Hall (blackarmy cutworm), J. Henigman (vertebrate animals, mites) and J. Muir (abiotic injuries, nematodes, chapter editor). Valuable input from regional pest management specialists is gratefully acknowledged.

- J. Muir, Protection Branch, Victoria.

A new publication entitled: "Forest Insect and Disease Impacts in Tree Farm Licenses (TFL)". The first version of this document was produced and distributed on a limited basis, in March, 1989. This work contains the "best estimates" of pest impacts at the TFL level, similar to those produced in a companion document in 1986 entitled "Forest Insect and Disease Impacts in Timber Supply Areas."

The intent of the work was to produce impacts that might be suitable for inclusion into TSA/TFL analyses and other planning projects. However, as pest damage appraisal is in its infancy, on a Provincial level, only a few impacts or methods will be suitable for the original objective. Other uses have included prioritizing pest damage appraisals, identifying important pest issues and early impact estimates for budget proposals.

Future improvements of this work are expected to come from the results of current research and survey initiatives. These initiatives will lead to improved techniques for planning at the TSA/TFL level for three to four pests in the next two years.

- S. Taylor, Protection Branch, Victoria.

Quiz: Should silviculturally improved stands get more pest protection than unimproved stands? Answer: Not necessarily. It depends on the magnitude and probability of losses to pests in both cases and more importantly, on the expectation of timber values saved due to protection efforts in each case.

Using car wax and rust as an analogy for protection efforts and pests, it is clear that waxing a stock (unimproved) Mercedes is more important than waxing a hopped-up (improved) Volkswagen.

- T. Niemann, Integrated Resources Branch.

Literature Review on Irregular Tree Mortality. Work is underway on a literature review covering the various abiotic causes of irregular tree mortality. The most common agents are wind, temperature (cold and heat), precipitation (rain, glaze ice, rime and hoar frost, hail, and snow), and fire.

Each item will be discussed in turn, with the forest management implications as well as possible mitigative measures included. Many of these causes of irregular mortality are especially important in second growth stands and over a wide range of sites in B.C. and elsewhere. The review will be published as a Pest Management Report.

- J. Parminter, Protection Branch, Victoria.

Cariboo Tackles Training. Basic training in pest biology, detection, damage appraisal and management prescription has been carried out in four of the five Cariboo Forest Districts this spring. The sessions have emphasized pest management at the pre-harvest prescription state and have been directed towards Forest Service and forest industry staff involved in the Preharvest Silviculture Prescription process. The next session is scheduled for Williams Lake in early May.

- M. Hamm, Cariboo Forest Region, Williams Lake.

Forest Pest Matrix to Appear in Ecosystem Guide. The Kamloops Forest Region's ecology group within Research are publishing an ecosystem interpretation guide for the Kamloops Forest Region. Pest management was able to collate pest occurrence information rendered by Forest Insect and Disease Survey (Forestry Canada) and district pest management staff to produce a pest matrix by host and biogeoclimatic subzone and variant. The matrix will be an appendix to the field-ready guide. This will increase field staff awareness of pests and also present the opportunity to generate new pest occurrence information.

- H. Merler, Kamloops Forest Region, Kamloops.

Regional Audit of District Pest Management Plans. Pest Management Plans for Districts in the Prince George Forest Region were first compiled in 1987. Districts recently revised their plans and the new versions were examined and discussed during a Regional audit during February - March 1989. Plans cover a five-year period and are expected to be updated every year. The plans identify common district pests and their impact on various hosts. District objectives and strategies for contending with the various pests are combined with an outline of responsibilities of licencees and other agencies. An outline of the Pest Management Plan is available on request.

- R. Hodgkinson, Prince George Forest Region, Prince George.

Co-op Students Hired for Special Pest Management Projects - Protection Branch. One co-op was hired for the spring term to undertake root rot surveys associated with the Bowser Demonstration Forest Project, develop a format and assemble data for two Pest Management Information System projects (Forest Resource Development Agreement pest reports and protection trials - Px) and conduct other projects as required. The experience gained on both sides was worthwhile. Further, two students will be hired for the summer term, one from the Computing Science Faculty at SFU and the other from General Biology.

Their anticipated workload will include:

- development of portions of the PMIS: (bark beetle ledgers, FRDA and Px trial reports);
- coordination of damage appraisal surveys: (white pine weevil); and
- assemblage of control options and documentation for the Bowser Project.

- S. Taylor, Protection Branch, Victoria.

Prince Rupert Region Co-op Student Pest Management Projects. Seven co-op students, five from SFU and two from UVIC, will be working in the Prince Rupert Region this summer on several topical projects. These projects are:

FOREST DISTRICT	NUMBER OF STUDENTS	PROJECT
North Coast	2	- surveys to assess porcupine damage in second growth hemlock
Kispiox	2	- root collar weevil damage surveys; establish and remeasure damage appraisal plots
Morice	1	- hazard and risk rating stands using the Nelson Forest Region approach for long-term management of mountain pine beetle - evaluate the efficacy of fall and burn using four continuous year's of probe data
Prince Rupert Region	2	assorted projects including: - stem mapping Tomentosus infection centres in a permanent sample plot near Topley Ldg., Morice Forest District - stem mapping and destumping trial at Atrill Creek, Bulkley Forest District - porcupine repellant trial in the Kalum Forest District (E.P. 570) - pheromone bait placement, Bulkley Forest District - root collar weevil surveys, Kispiox and Bulkley Forest Districts - rot collar weevil and stalactiform blister rust PSP establishment, Decker Lake, Lakes Forest District

Results of these projects will be reported in the Fall issue.

- Tim Ebata, Prince Rupert Forest Region, Smithers.

Pest Management in Seed Orchards. The following are ongoing projects:

- Red cedar cone midge, (Mayetiola thujae) surveys will be conducted in western red cedar orchards for the third year. Annual fluctuations in population levels are being monitored, the extent of damage to cone crops is being evaluated and a control program is being developed.
- Douglas-fir cone gall midge, (Contarinia oregonensis) direct injection pesticide control studies will continue. Metasystox-R was dispensed directly into crop trees known to be infested with the midge in a 1987 trial. Additional trees will be injected this year to further refine the treatment method.
- Western spruce budworm, populations crashed in 1988 in the interior spruce orchards after heavy defoliation in 1987. Surveys will again be conducted in 1989 and an early May ground application of B.t. will be used if needed to protect cones from damage.
- Adelgid insect pests of all types will be under heavy scrutiny this year. All spruce orchards will be surveyed for the Adelges/Pineus disease complex, the ratio of which was shown to alternate on an annual basis in previous surveys, (1986-1988 data). Thiodan insecticide has shown possibilities for control if a spray is applied prior to the time that the insects start to feed in the spring. This trial will be expanded in 1989.
- Balsam woolly aphid surveys were conducted on every tree in one orchard in 1988 in order to locate all severely infested trees. Two sprays of Safer's Insecticidal Soap^{R} were applied and control seems successful. Monitoring of these trees will continue in 1989 to determine if clonal and/or provenance effects are factors in severe damage. The other balsam orchards will be surveyed for damage in 1989, and all orchard infestations will be monitored in the future.
- Disease surveys will be conducted for swiss needle cast, rhabdocline, meria, interior spruce cone rust and pine rusts.
- Ferbam 76% WDG^{R} fungicide and alternate host eradication will be used operationally to control interior spruce cone rust, Chrysomyxa pirolata at Skimikin. Operationally, two-three fungicidal sprays are required to control this rust because of cone phenology and the length of the spore flight. Bayleton 50% WP^{R} fungicide has been tested for the past three years and has also been shown to be effective against this disease. In 1989, a single spray will be tested for efficacy against this rust because Bayleton has been reported to have some systematic properties.

The following are new projects:

- Spruce conelet surveys for spruce seedworm and spiral spruce cone borer are being conducted to predict seed damage. Trial applications of dimethoate and metasystox-R insecticides will be used against these pests if infestation levels warrant.

- Investigations of the spruce spider mite, (Oligonychus ununquis) and its predators were begun in 1988 with mixed results. These included weekly counts of mite and predator populations in potted spruce seed orchards and the release of purchased predator mites, Phytoseiulus persimilis. Predators will be released again in 1989 if mite problems develop this year.
- A trial to control a gall midge in yellow cedar which attacks foliage and reproductive structures is being established at orchards on the Saanich peninsula. Preliminary testing had shown that dimethoate may be effective in reducing damage.
- A University of Victoria biology co-op student, will be hired to study damage done to cone crops by red crossbill birds on the Saanich peninsula, if time allows, a Leptoglossus (seedbug) monitoring program will also be conducted.

- D. Summers, and B. McEntire, Silviculture Branch, Victoria.

The Two Major Insect Pests Attacking Interior Spruce Cones have both had Taxonomic Name Changes. The spruce cone maggot, also known as the spiral spruce cone borer is now classified as Strobilomyia neanthracinum Michelson. It was previously called Hylemya anthracina czerny. The spiral spruce cone borer does just as its name suggests, spiraling around the cone axis destroying scale tissue and seeds in its path. It leaves clean but often pitchy tunnels. This pest will not be found in old cones as it leaves the cones to overwinter in the duff.

The spruce seedworm is now called Cydia strobilella (L) and was previously called Laspeyresia youngana Kearfott. The seedworm feeds only on seeds and overwinters in the axis of the cones.

- D. Summers and B. McEntire, Silviculture Branch, Victoria.

Forest Nursery Pest Management Update. The new Nursery Pest Control Officer position has recently been filled by Dave Trotter. Dave will be responsible for conducting and coordinating trial work aimed at developing and improving pest management programs on the nurseries.

The use of pesticides is becoming an issue of concern in many industries including reforestation nurseries, and work on alternate methods of control is being emphasized. The main projects planned for the 1989 growing season are as follows:

- In cooperation with the Ministry Seed Centre, Palge Axierood of B.C. Research and Jack Sutherland of Pacific Forestry Centre, an extensive trial to test sterilizing agents for control of seed borne fusarium will be conducted.
- Under Forest Resource Development Agreement (FRDA) project 2.68, Mike Peterson of A.F.S. Research will be testing several materials and methods to clean root rot pathogen inoculum from styroblocks between crops.
- In cooperation with the nursery weed specialist in Ontario, the herbicide Cobra^{R} will be tested for control of weeds in bareroot panels.

- Now that most of the nursery stock is cold stored in freezing temperatures the recommended pre-storage fungicide application may no longer be necessary. Trials to compare treated and untreated stock will be conducted in the fall.
- The fungicides Ridomil^{R}and Truban^{R} will be tested operationally at several nurseries for control of Pythium caused root rots.
- G. Shrimpton, Surrey Nursery, Surrey.

Trisetacus Mite Update. Over the past few years Trisetacus species mites have been recognized as a pest problem of lodgepole pine seedlings in some forest nurseries. Based upon a survey of selected plantations of lodgepole pine known to have been planted with seedlings infested with the mites, we are now reasonably satisfied that the mite has not become an economic pest of forest plantations.

Mite infested pine seedlings were traced to plantations in the Kamloops, Nelson, Prince George and Prince Rupert Forest Regions. Most of the plantations were surveyed and in a few locations in the Nelson and Prince George Forest Regions a very small number of seedlings were found infested and showing damage symptoms.

Although we intend to survey some plantations not previously inspected in the Kamloops and Prince Rupert Forest Regions, it would appear that the mite does not pose a significant pest problem.

- J. Henigman, Protection Branch, Victoria.

Trisetacus spp Mites in Prince George Region. A total of 17 lodgepole pine plantations were surveyed in five Forest Districts of the Prince George Forest Region in 1988 for the mite Trisetacus campnodus. Trace levels of the mite were found in single plantations in the Vanderhoof and Ft. St. James Forest Districts, and symptomatic damage was observed in a third plantation in the Prince George Forest District. These plantations will be surveyed more closely this summer in order to determine the extent of mite occurrence and tree damage.

- R. Hodgkinson and L. Pedersen, Prince George Forest Region, Prince George.

Porcupine Update in Rupert Region. In the North Coast Forest District, the fisher introduction program to control porcupine damage took a big step forward when one of three adult fisher (purchased this winter) bore three young. The mother and babies are presently being fed a gourmet diet prior to their expected release sometime this summer in the Khutzeymateen valley. The two adult males will be released in mid-April. The annual survey for new damage in Khutzeymateen valley had to be postponed until May because of ice in the valley.

In the Kalum Forest District, damage assessment surveys totalling about 60 km in length were conducted in mid-winter. Current attack increased from 1.4 to 2.2% and 0.92 to 1.36% in two areas and declined from 0.82 to 0.42% and 1.35 to 0.4% in two other areas, between 87/88 and 88/89. In contrast all four

areas showed an approximate doubling in current attack between 86/87 and 87/88. The porcupine hunting program administered through a local trapper in Terrace, received payment for 78 porcupines which may partially explain the drop in current attack in two of four areas. Continuing assessment of damage is needed to evaluate the hunting program's effectiveness.

The porcupine population dynamics study is about to get underway in 89/90. Tom Sullivan of Mammal Pest Management will be trapping and collaring porcupine over the next few years to establish relationships between porcupine numbers and damage levels. Collaring of porcupines with radio transmitters will provide information on when and how far porcupines will move between winter and summer habitats. Two students at U.B.C. will be helping Tom with this study.

- W. Martin, Prince Rupert Forest Region, Smithers.

Vole Damage Assessment Report Forest Resource Development Agreement 1.42 Update. Tom Sullivan of Mammal Pest Management recently completed a report outlining the incidence of meadow vole and lemming damage to young plantations of lodgepole pine and interior spruce in west-central British Columbia. Fifty-eight plantations were surveyed for seedling survival and stocking and an additional 21 older (6-16 years) plantations of lodgepole pine were surveyed for tree damage. Survival of pine (average 47.7%) was significantly lower than that of spruce (average 56%). Twenty-four of the 58 (41.4%) plantations were not satisfactorily restocked (NSR). Planted trees were attacked significantly more than trees originating from natural regeneration. Young plantations subjected to severe attack (NSR status) occurred in the spruce-subalpine fir forest type at elevations greater than 800m and at north to northeasterly aspects. The susceptible plantations generally had mechanical or no site preparation with a consequent high complexity of post-harvest debris and limited vegetation cover (particularly grass and shrubs). Older plantations with serious damage had high levels of vegetation complexity. A forecast model is outlined to predict when and where outbreaks of vole and lemming damage will occur. This information will be used to develop regional guidelines to assess the risk of vole and lemming damage in the years to come.

- W. Martin, Prince Rupert Forest Region, Smithers.

Pest Management Flagging Tape. This tape, requested to be ordered by the Forest Pest Review Committee, has arrived. It has been produced on fluorescent pink ribbon with black stripes, and the words "PEST MGT" between the stripes.

Supplies can be obtained from:

- The Abbotsford Provincial Warehouse for Ministry employees (contact Martin Hinnen or Neil Finlayson 850-1153) or
- Neville Crosby (Vancouver, 853-4343) for other agencies or personnel. Costs should be in the $2.25 to $2.50 range per roll.

Due to the high cost of this ribbon its use should probably be limited to marking the point of commencement of lines, plot centers or other similar purposes.

- S. Taylor, Protection Branch, Victoria.

FOREST ENTOMOLOGY

Bark Beetle Program Technical Audit. Price Waterhouse conducted a comprehensive technical audit of the five-year bark beetle program during 1988/89. The objectives of the audit were to determine the benefits and effectiveness of the program and to make recommendations for program improvements. The audit report states that, overall, the program has accomplished the objectives of harvesting affected timber, reducing the spread of infestations, and protecting forests at risk. Further, the report indicates the program was effective, economical, and efficient. Thirty recommendations were presented that would enhance the program. Information from the audit will be made available after review and acceptance by various levels of government.

- P. Hall, Protection Branch, Victoria.

Bark Beetle (Pest Management) Funding 1989/90. The bark beetle program will be continued in 1989/90 with an allocation of $3.5 million. This funding will be allocated to Regions and Districts, as in the past, on the basis of outbreak status and project-specific proposals. Activities funded under the program will be similar to past years; access for harvesting will not be funded under the program. Two-phase funding will be used as in 1988/89.

- P. Hall, Protection Branch, Victoria.

Mountain Pine Beetle Winter Mortality in the Prince Rupert Region. Bark samples (15 x 15 cm) from 67 trees were collected during February and March fall and burn operations throughout the Lakes, Morice and Bulkley Forest Districts. Although the sample size was small, the survey did give an overview of the mortality rate in each of the three interior districts concerned with mountain pine beetle management. The survey results allow us to roughly predict the rate of expansion of the remaining mountain pine beetle populations.

The table below shows that mountain pine beetle larval mortality was highest in the Bulkley Forest District at 96%. Despite the low larval mortality found in the Lakes and Morice Forest Districts, populations are not expected to increase significantly since less than 50% of the sampled trees contained egg galleries with any larval galleries. A late flight due to an unseasonably cool, wet summer in 1988 caused parent adults to overwinter before laying eggs. On average in the Region, only 15% of the parent adults survived the winter and it is unlikely that this will contribute significantly to the 1989 or '90 flight. Furthermore, the calculated "r-values" predict a declining population as well.

This general decline in beetle activity will allow harvesting to catch-up to the beetle infestations and, in some cases, permit a return to orderly, planned harvest schedules. The opportunity to get ahead of the beetles also exists if harvesting is targeted at the liquidation of highly susceptible timber types. Managers must be reminded of this even though the apparent threat of infestation appears to be low.

Results of the 1988/89 Mountain Pine Beetle Winter Mortality Study
Prince Rupert Forest Region

Forest District, Location	No. of Trees (Slabs)	No. of bark slabs without beetle	No. of bark slabs with beetle but no larvae	% mortality Larvae	% mortality Adults	"r value"
Lakes F.D.						
Average	15(30)	8	9	43	74	.4
Morice F.D.						
Haul Lk.	10(20)	0	9	36	76	1.1
Buck Flats	10(20)	6	5	23	74	2.3
Francois Lk.	4(8)	1	8	29	95	0
Average	24(48)	7	19	30	78	1.13
Bulkley F.D.						
Nilkitkwa	12(24)	9	7	81	95	.4
Bulkley V.	19(38)	2	17	96	96	0
Average	31(62)	11	24	96	95	0.2

- Tim Ebata, Prince Rupert Forest Region, Smithers.

Harvesting for Pest Management Purposes. As in past years there has been forest harvesting in reaction to pest damage. The following information summarizes harvesting in response to pest damage in the six Forest Regions:

mountain pine beetle:

Cariboo:	2,813,000 m^3
Kamloops:	2,640,000
Nelson:	1,703,000
Prince Rupert:	1,464,000
Prince George:	350,000
Total:	8,970,000 m^3

spruce beetle:

Nelson:	13,000 m^3
Prince Rupert:	81,000
Total:	94,000 m^3

balsam bark beetle:

Prince Rupert:	81,000 m^3

hemlock sawfly:

Nelson:	3,000 m^3

root rots:
Vancouver: 46,000 m^3

armillaria root disease:
Nelson: 4,000 m^3

dwarf mistletoe:
Nelson: 9,000 m^3

white pine blister rust:
Nelson: 30,000 m^3

- D. McPhail, Timber Harvesting Branch, Victoria, and E. Morris, Nelson Forest Region, Nelson.

Cariboo Beetles Winter Well. Winter larval survival of mountain pine b etle in the Cariboo was sampled in all Forest Districts except Williams Lake, which has virtually no pine beetle activity. Samples were collected between February and March 1989. Larval survival from the four remaining Forest Districts was as follows:

Quesnel	65.6%
Horsefly	73.0%
100 Mile House	60.0%
Chilcotin	72.8%
(MSMA-treated trees 6.7%)	

Although a major population expansion is not projected, this high rate of larval survival indicates that maintenance of a vigorous control programme is still a top priority.

Because of drought conditions, Douglas-fir beetle populations have increased in the Region, especially in the Williams Lake Forest District. Survival in this District at the Alex Fraser Research Forest was 73.5% for pupae and 77.2% for adults. An intensive trap-tree programme has been initiated to prevent further expansion.

- L. Rankin, Cariboo Forest Region, Williams Lake.

Cariboo Forest Health Plan 1989/1990. Cariboo's forest health plan for 1989-90 Emergency Bark Beetle funds has primary objectives to reduce populations of mountain pine and Douglas-fir beetle and to salvage a significant volume of timber.

Aerial surveys using fixed-wing aircraft and 1:40 000 colour forest cover maps will be conducted over the entire Region this summer. Two levels of intensity will be used in surveying, depending on the level of pest activity in the area. Aerial photography may be used to further document local outbreaks.

Ground surveys to further delineate and appraise damage detected by aerial surveyors will take place in autumn, and single-tree eradication in conjunction with small-scale harvesting will be used to deal with spot infestations as well as on the boundaries of the Chilko Lake outbreak. Pre-logging containment baiting and salvage harvesting will be used where indicated in other areas.

While accelerated harvesting and direct control activities have successfully eliminated outbreak conditions in most areas, reappearance of outbreaks, in particular in Chilcotin Forest District, are ominous reminders that a return to the catastrophic outbreak situation of a few years ago is still very possible.

- M. Hamm, Cariboo Forest Region, Williams Lake.

Mountain Pine Beetle Management Plan for Manning Park. The Ministry of Parks, South Coast Region prepared a strategic plan for the management of mountain pine beetle in Manning Park. A plan was developed in the context of the threat of beetle-caused damage to the Park's features and neighboring forests, the natural succession of lodgepole pine ecosystems, the management options that are available, and the relevant policies and goals that influence the management of the Park.

The report recommends that the direct control of mountain pine beetle be continued in the Park, with a number of technical modifications to improve efficiency.

Currently, the Ministry of Parks intends to continue with direct control efforts in the Park, essentially following the recommendations from the report.

- D. Heppner, Vancouver Forest Region, Burnaby, and R. Simmons, Ministry of Parks, Vancouver.

Pine Beetle Hazard Rating Trial. A project to evaluate the use of a hazard rating system has been undertaken in the Okanagan Timber Supply Area. This system is a two-tier approach whereby inventory information is used to provide overview hazard to identify areas of high concern. Subsequent detailed hazard and risk assessments will then be implemented in priority, high hazard areas. This type of hazard rating approach will facilitate beetle management efforts including harvesting and other treatments. Once a useful methodology is confirmed, such systems will be implemented in other areas of the Province.

- P. Hall, Protection Branch, Victoria.

Mountain Pine Beetle Hazard Mapping in Prince George Forest Region. Detailed hazard mapping for mountain pine beetle has been completed for the majority of the Fort St. James Forest District. Base maps have been colour-coded by species composition of lodgepole pine stands (Pl-major, mixed, and minor). Overlays depict age classes of lodgepole pine (age classes 1-3, 4+5, 6+), and mountain pine beetle infestations. The table below summarizes the incidence of mountain pine beetle attack on lodgepole pine by species composition and age class. Approximately 80% of mountain pine beetle attacks occurred in stands of age class 6+ regardless of whether lodgepole pine comprised less

than 20% or more than 80% of the stand. It is apparent that age class is more important than species composition in hazard rating stands in the Fort St. James Forest District. For instance, mountain pine beetle attacks were over four times heavier in Pl-minor age class 6+ than in Pl-major age class 4+5. Hazard mapping will assist Forest Service Protection, Timber and Planning staff and licencees in managing mountain pine beetle as further access routes are upgraded or developed within various supply blocks.

OVERALL
INCIDENCE OF MOUNTAIN PINE BEETLE ATTACK
IN FORT ST. JAMES DISTRICT - 1988

	NUMBER OF MOUNTAIN PINE BEETLE ATTACKS BY TYPE/AGE CLASS							
	AGE CLASS 6+			AGE CLASS 4 + 5			OTHER	
INFESTATION PATTERN	PL Major	PL Mixed	PL Minor	PL Major	PL Mixed	PL Minor		TOTALS
SINGLE TREES	106	112	121	20	20	8	37	424
SMALL PATCHES	57	78	88	26	16	3	15	283
LARGE PATCHES	8	12	5	0	2	1	0	28
TOTALS	171	202	214	46	38	12	52	735

- R. Hodgkinson and K.Magee, Prince George Forest Region, Prince George.

Mountain Pine Beetle Spread Model. A Forestry Canada developed model which evaluates beetle spread and impact on a compartment level of resolution is being evaluated by Dr. M. Shrimpton at Protection Branch. Inventory data for selected Timber Supply Areas have been compiled and various outbreak scenarios will be run. The model, once tested, will be a useful tool in developing management strategies and will provide a basis for estimating the potential impacts of the beetle in a Timber Supply Area.

- P. Hall, and M. Shrimpton, Protection Branch, Victoria.

Beetle-Proofing in the Bulkley Forest District. Layout for four 6.25 ha "beetle-proofing" blocks has been completed this winter on a mature pine stand near Thompson Creek in the Bulkley Forest District. Four spacings: 2 x 2, 3 x 3, 4 x 4 and 5 x 5m, were selected to determine the effects of the different spacings on both snow depth (and its effect on usage by deer) and mountain pine beetle activity. Unspaced trees surrounding the spaced blocks will be used as the control.

The study site is within a stand with a history of repeated infestation by mountain pine beetle from an unchecked infestation across the valley. The stand is also a high-value winter refuge for deer in a valley that is being rapidly denuded by agricultural leases and licencee logging. To pay for the establishment of the trial, Wildlife Branch, Ministry of Environment contributed Forest Resource Development Agreement (FRDA) funds and the Forest Service made up the balance from emergency bark beetle money. Project layout cost $4,400 and took 20 man-days to complete (two man crew). Harvesting of the marked trees will be completed this summer by horse-loggers. Complete (100%) probes of the entire stand will be performed annually following harvesting. Results will be reported in future issues.

- T. Ebata, Prince Rupert Forest Region, Smithers.

Mountain Pine Beetle in the Kamloops Forest Region. Protection and Inventory Branches are doing a cooperative investigation with the Multispectral Electro-optical Imaging Sensor (MEIS) in order to detect mountain pine beetle green attack. This project will determine whether the MEIS sensor can detect green attack trees and, if possible, identify the amount of damage necessary for green attack to be detected.

In the Penticton Forest District a sample of approximately 200 green attack lodgepole pines and the same number of unattacked trees will be located (area not exceeding 1 km by 20 km). These trees will be identified on aerial photography at a scale of 1:5 000. They will also be photographed at a scale of approximately 1:2 000 with colour infrared film. MEIS data with a pixel resolution of approximately 1 m will be acquired using a filter set identified as promising for mountain pine beetle green attack detection. The discrimination between unattacked trees and green attacked trees will be determined through statistical analysis of the spectral reflections of test and control trees.

- L. Maclauchlan, Kamloops Forest Region, Kamloops.

Cariboo Douglas-fir Beetle on the Upswing. Aerial surveys conducted in January and February revealed increases in Douglas-fir beetle damage of four to five times that indicated by last summer's surveys. The area infested is now conservatively estimated at over 300 ha. Much of the Cariboo remains under the influence of a drought (now in its third year) which has predisposed trees to beetle attack as well as led to early and rapid changes in colour and needlefall.

Management strategies were developed in late winter by the Williams Lake, 100 Mile House, Chilcotin and Quesnel Forest Districts affected, and now are being carried out in cooperation with local forest companies. Tactics include the use of conventional trap trees, as well as standing baited trees, in conjunction with an energetic harvesting programme.

It is our fond hope that with prompt and aggressive action we may avoid a return to the Douglas-fir beetle outbreak conditions of as little as four years ago.

- M. Hamm, Cariboo Forest Region, Williams Lake.

Unit Crews. Fire suppression Unit Crews will be based at Smithers, Vanderhoof, Riske Creek, and Princeton in 1989. These crews, when not required for suppression duties, will be available for pest management project work. Any pest management related project is fair game - go for it.

- P. Hall, Protection Branch, Victoria.

Western Spruce Budworm. The outbreak of western spruce budworm, primarily in the Kamloops Forest Region, declined by approximately 50% in 1988. However, defoliation is expected to continue in many areas of the region in 1989. A program to determine the impact of the budworm on dry-belt Douglas-fir and evaluate the efficacy of control using B.t. was initiated in 1986. This program will continue in 1989 with treatments applied to establish blocks containing permanent sample plots (PSP). Annual measurements of treated and untreated PSP's will continue to be made until the outbreak recedes and tree recovery is complete. The information will form the basis of future management strategies.

- P. Hall, Protection Branch, Victoria.

Blackheaded Budworm on Vancouver Island. Approximately 4 830 ha were lightly to moderately defoliated last summer in the Holberg area on Vancouver Island. Based on previous outbreaks and egg sampling, a substantially larger area of defoliation is expected this summer (see: Humphreys and Clarke. 1989. Forest Insect and Disease Conditions, Vancouver Forest Region. 1988. FIDS 89-6).

Due to environmental and public concerns regarding the use of insecticides, B.t. (Bacillus thuringiensis) is probably the only insecticide that would be considered for control treatments should they be deemed necessary. Currently, however, B.t. is not specifically registered for use on blackheaded budworm. In Canada, pesticides must be tested and proven efficacious on the target organism by the intended application method before they will be registered for use on that organism. This has not been adequately completed for western blackheaded budworm. This leaves the forest managers of the area with limited options to deal with this budworm.

The responsibility for registering insecticides for forestry use currently lies within Forestry Canada's bailiwick, and they have tentatively proposed a research trial for this spring. The B.C. Ministry of Forests is currently investigating the feasibility of supporting this trial.

- D. Heppner, Vancouver Forest Region, Burnaby.

Douglas-fir Tussock Moth. Pheromone trapping and egg mass surveys in 1988 do not predict defoliation for 1989. However, populations are likely increasing and defoliation is expected in 1990 or 1991. When outbreaks are detected, treatment with acquired stocks of virus will likely be employed. Objectives of the treatments would be to control the tussock moth in the early stages of outbreak, avoiding widespread damage as occurred in the last outbreak in the early 1980's. Planning has already begun to ensure an adequate, coordinated response.

- P. Hall, Protection Branch, Victoria.

Student Studies Pissodes Populations in Cariboo. A co-op student from the University of Victoria is surveying young lodgepole pine stands (10-20 years) in Cariboo to determine the distribution and intensity of attack of the lodgepole pine terminal weevil (Pissodes terminalis). To date, 21 pine stands (8 planted and 13 natural) have been surveyed using systematic row sampling at various areas throughout the Region. Initial results indicate that current attack is 0.15%, with planted stands averaging 0.32% and natural stands averaging 0.04%.

Trees that showed any evidence of weevil attack, either current or old, averaged 2.06% (3.71% in planted stands and 1.04% in natural stands) of the stand. Areas surveyed in the western part of the Region generally showed a higher level of attack than those in the east, and additional plots are planned for the extreme west.

Permanent sample plots established in 1986 to assess damage and growth reduction caused by terminal weevils were also resurveyed. Average current attack in 1986 was 1.76% (range 0.53 - 3.70%) and 1.40% (range 0 - 4.07%) in 1989. Because these attack levels are significantly higher than in other stands surveyed, additional plots are planned for stands adjacent to the permanent sample plots.

All data gathered to date suggested that the lodgepole pine terminal weevil is not a serious pest in Cariboo.

- K. MacKenzie, Cariboo Forest Region, Williams Lake.

How Evil is the Root Collar Weevil in the Kispiox Forest District? At least 30 pine plantations will be surveyed this summer in the Kispiox Forest District's ICHmc3 (Interior cedar hemlock - moist cold variant) for Warren's root collar weevil, Hylobius warreni. Last summer, Forest Insect and Disease Survey (Forestry Canada) and local forestry contractors reported extremely high levels of current attacks (e.g., up to 100% of the stems girdled in a 15 year old stand) in several plantations. These reports established the need for a proper investigation of the insect's distribution and impact.

Forest Resource Development Agreement (FRDA) direct delivery pest control funds will be used by a UBC Forest Entomology MSc student to determine the extent and intensity of weevil damage and attempt to relate these figures to site and mature stand conditions. The ultimate goal is to develop a means of predicting where weevil damage will be severe during the pre-harvest silvicultural assessment and prescribe cultural practices that will minimize damage.

Preliminary results and conclusions concerning the epidemiology of this pest should be available in the next issue.

- T. Ebata, Prince Rupert Forest Region, Smithers.

Gypsy Moth. 1988 pheromone trapping indicates that past eradication efforts have been successful. No treatments are being planned by Agriculture Canada in British Columbia in 1989.

The pheromone trapping detection survey will continue in 1989 and the Forest Service will continue its participation. The Forest Service will place approximately 2000 traps in recreation sites and other high-use forested areas to support trapping programs carried out by Agriculture Canada and Forestry Canada/Forest Insect and Disease Survey.

- P. Hall, Protection Branch, Victoria.

Entomology Videotapes. A wide variety of entomological topics, from western spruce budworm control operations in Paul Lake Park to the gypsy moth problem, are available from Protection Branch. All are in VHS format and run from approximately five to 30 minutes. If you wish to borrow any of these tapes, please contact Pat Humphreys at 387-8737. A list of titles currently available can be found in the videotapes section of this issue.

- P. Humphreys, Protection Branch, Victoria.

Manual Chapters for Forest Insects. Sections dealing with management of weevils and black army cutworm have been written as part of Chapter 11 of the Protection Manual, Volume 2. Chapter 10, dealing with defoliators is expected to be completed and published in early summer, 1989.

- P. Hall, Protection Branch, Victoria.

FOREST PATHOLOGY

Pinewood Nematode. Regulatory agencies and the Council of Forest Industries of B.C. are negotiating changes in the bark certification program to assure United Kingdom customers that British Columbia lumber is free of potential vectors of pinewood nematode.

Recent research papers indicate that there is very little possibility that the nematode could be pathogenic in Scandanavia or Europe. The pinewood nematode has little ability to cause disease, but rather lives as a secondary organism on fungi that are associated with dead or declining trees from, for example, drought or fire. Research is continuing at several centres in Canada to address the pinewood nematode issue.

- J. Muir, Protection Branch, Victoria.

Field Guide for Laminated Root Rot. An eight page illustrated brochure in field-notebook format was prepared by Sterling Wood Group, Inc. The guide is intended to facilitate root rot assessment of coastal sites being rehabilitated to re-establish conifers. The project (2.53) was funded under the Canada-British Columbia Forest Resources Development Agreement, Backlog Reforestation Extension, Development and Research Program.

For a copy of the field guide and field assessment forms, contact J. Muir.

- J. Muir, Protection Branch, Victoria.

Stump Injection for Root Rot. A trial stump or tree injection with chloropicrin is planned to determine if the method might be feasible in British Columbia. Chloropicrin recently was registered in the United States as a control for laminated root rot, based on experimental data by Dr. W. Thies, USDA Forest Service.

Workers in British Columbia are interested in the possibility of controlling root rot in recreation sites where standing, live trees might be protected or disinfected. Dr. Thies will visit several potential sites and advise on methods. If suitable trials can be set up, Dr. Thies will bring his equipment and help set up trials, possibly in autumn, 1989. A field day will be held in conjunction with the trial to describe the treatment and demonstrate the equipment. Anyone interested in receiving notice of the field day should contact J. Muir.

- J. Muir, Protection Branch, Victoria.

Pathology Videotapes. Several videotapes are available from Protection Branch on a variety of disease topics, such as armillaria root disease, laminated root rot control, dwarf mistletoe, and tree pushing and stump pulling trials for root disease control. All tapes are in VHS format with running times of approximately 5 to 30 minutes. Please contact Pat Humphreys at 387-8737, if you wish to borrow any of these tapes. A list of titles currently available are in the videotapes section of this issue.

- P. Humphreys, Protection Branch, Victoria.

Cariboo Root Rot Disease Survey. The extent of the Cariboo Forest Region's lodgepole pine stands affected by root rots is unknown. To document the magnitude of the problem, an inventory survey method must be developed. Inland Timber Management (1984) Ltd. has entered into a Forest Resource Development Agreement (FRDA) - sponsored contract with the Forest Service to assist in designing a practical survey method.

Objectives:

Phase I

(a) to review aerial photographs supplied by the Forest Service (scale 1:10 000, colour) and determine criteria to identify forest stands with root disease;
(b) to design a programme for field checks; and
(c) to report methods and results.

Phase II

(a) to ground check areas suspected to have root disease to test aerial photograph interpretations;
(b) to conduct a trial root disease survey at MacIntosh Lakes area (if feasible); and
(c) to report methods, results, and recommendations for large-scale inventory surveys.

To date, Phase I has been undertaken and completed. The results of Phase I indicated that there was no problem identifying root disease centres on the photos. However local knowledge of the infected areas suggested that there was more diseased area than what was apparent on the photos. Phase II should help resolve these anomalies.

- D. Doidge, Cariboo Forest Region, Williams Lake.

A Pathological Gold Mine found in Salmon Arm. For those of you who attended the spring Forest Pest Review Committee meeting in Kamloops, 1988, you will, no doubt, never forget the Shuswap "Tour of Death" (or at least the barbecued chicken for lunch). Yes, Salmon Arm is root rot heaven but the district staff uncovered an earlier appreciation for root disease that predates our recent concerns. The year was 1964, and Dr. Gordy Wallis had just diagnosed laminated root rot in several stands of Douglas-fir. The District was troubled enough to commit to a survey to cover a wide range of Douglas-fir stands in the District, 104 kilometers in fact.

A Forest Resource Development Agreement pest control contract awarded to Amabilis Forestry Consultants of Vernon allowed the remeasurement of several of the survey strips. The results have frightening forest management implications. The root disease where it existed in 1964 has spread, but more importantly has changed the composition of the stand that it is located in. An age class five Douglas-fir stand in 1964 with 20% of the area infected has become not an older Douglas-fir stand with more root disease, but rather a young (age class three), less thrifty, western red cedar stand with just as much viable inoculum. The forest is still green, and to the casual observer, doing just fine. Why does the inventory still expect Douglas-fir to be growing here? Why do our Timber Supply Area plans call for the merchantability of absent Douglas-fir? Why when we harvest diseased Douglas-fir are we having difficulty getting a free growing conifer stand at age 20? All good questions to ponder.

Finally, with some long-term observations of root disease we can start addressing statements such as, "the disease has always been here..." or, "we will just sacrifice the 20% mortality and live with it." Now we can say, "you can't afford not to address root disease."

- H. Merler, Kamloops Forest Region, Kamloops.

Western Hemlock: An Affair of a Not so Rotten Heart. Forest Resource Development Agreement project 3.28 has given an interior wet belt species a sound bill of health. A report entitled "The Acceptability of Hemlock and Cedar in the Interior Cedar - Hemlock Zone of B.C." from Pathocon Consulting summarizes two years of field study. The purpose of the project was to see if hemlock could be grown to a merchantable size within a reasonable rotation age without unacceptable losses to heartrot or decay. One hundred and nine hemlock stands in the Interior Cedar Hemlock zone were sampled. Echinodontium tinctorium was the most prevelant decay-causing organism in hemlock. It was determined that hemlock could be grown to age 90 without unacceptable (10%) incidence of decay. Also the productivity, based on site index was not significantly different from that of Douglas-fir in three subzones studied.

- H. Merler, Kamloops Forest Region, Kamloops.

Nelson Forest Region Disease Management. Several disease management projects in the Nelson Forest Region are almost completed or are at the draft report stage. Surveys under the Forest Resource Development Agreement pest control program include: armillaria root disease in plantations in the Golden Timber Supply Area; rhizina root disease in recently burned and planted areas in the Region; an evaluation of sites in the Arrow TSA believed to be underrated by inventory procedures because of disease problems; and an evaluation of the

amount of roots removed in a pushover-logging root disease control trial north of Revelstoke.

Management projects for the Region include: standard operating procedures for armillaria root disease; a comprehensive white pine management plan; and a forest health plan to be elaborated for each Forest District.

For further information, contact

- D. Norris, Nelson Forest Region, Nelson, and
  J. Muir, Protection Branch, Victoria.

Tissue Culture of White Pine. Surveys funded under the Forest Resources Development Agreement Pest Control Program have revealed several western white pine trees in the Nelson Forest Region that show resistance to white pine blister rust.

National Research Council agreed to culture three of the most promising trees. The resulting propagules will be used to establish a white pine trial in the Region, and any surplus propagules will be distributed to other interested cooperators and other Regions, upon request. For further information, contact

- D. Norris, Nelson Forest Region, Nelson.

Tomentosus Root Rot Trial at Knockholt: Pathocon Consulting of Prince George was awarded a Forest Resources Development Agreement pest control contract to establish a root disease spacing trial in the Morice Forest District. A root disease survey was conducted over a 20 hectare area in a (60 year old) second growth spruce stand of natural origin. The stand was found to have an infection level of about 25% (by area), and infection centres ranged from single tree infections to centres approximately one hectare in size. Larger centres were generally of the "classic" root disease form with central clearings surrounded by dead or symptomatic trees. Given the distribution of disease in this stand, Pathocon recommended using the line intercept or strip survey method to estimate tomentosus root rot incidence. The disease survey was used to locate nine one hectare units, which will receive one of three treatments: 1) manual spacing, 2) chemical spacing, and 3) control. Each treatment will be replicated three times. Permanent sample plots will be established in all three treatments, once the spacing operation is completed this fall. The project will provide information concerning the effects of spacing on the spread and impact of the disease.

- W. Martin, Prince Rupert Forest Region, Smithers.

Dwarf Mistletoe Assessment in Pine Stands. Two projects assessed dwarf mistletoe incidence and effects in lodgepole pine stands in the Prince George Forest Region. The projects - funded by the Canada - British Columbia Forest Resources Development Agreement Pest Control Program - indicated that out of 20 sampled young pine stands (up to 20 years in age) southwest of Prince George (Westlake area), 18 were free of mistletoe in the young trees. Two stands had dwarf mistletoe in approximately 60 ha of the total 1 200 ha sampled, about 5%. Apparently sanitation treatments for dwarf mistletoe that are considered operational measures at or following harvesting in the central interior of B.C. have been very successful in preventing infection of new forests.

Another project in 60-80 year old pine stands gathered inventory data on four plot clusters with two levels of mistletoe infection: light and moderate to heavy. The data will be analyzed in cooperation with Dr. A. Thomson, Pacific Forestry Centre, to determine the effects of mistletoe infection at several levels of stand stocking. A set of "impact curves" will be generated, and then the previous roadside and plot mistletoe survey data will be analyzed to determine the mistletoe effect in the southern part of the Prince George Timber Supply Area.

- J. Muir, Protection Branch, Victoria.

European Leafy Mistletoe. B.C. Ministry of Forests personnel participated in a ground survey in December 1988 for detecting the extent of a new pest occurrence - European leafy mistletoe (Viscum album) - in Victoria.

A total of five infected trees on four residential lots have been detected. No infection of nearby susceptible native and ornamental trees was detected.

My impression is that the mistletoe has been established by cultivation by individuals, and it poses no risk to native trees. Agriculture Canada is considering what action, if any, should be taken to deal with this new pest. Fortunately, the risk of spread of the mistletoe is very low, and there is no need to make a quick decision on these occurrences.

- J. Muir, Protection Branch, Victoria.

Forestry Canada Spacing Trial Remeasurement. A sanitation spacing trial established by Forestry Canada in the late sixties was recently reassessed by a Forest Resource Development Agreement pest control contract with Pathocon Consulting. The incidence level of blister rust (stalactiform and comandra) was about the same in the treated (500 stems/ha) (11.7%) and control (11.3%) in 1988, and similar to the level in the stand as a whole (12.3%) in 1967. In contrast, atropellis canker was more common in the control (8 167 stems/ha) (16%) than in the spaced area (5.5%), with intermediate levels present in 1967 (10.5%). Western gall rust levels were slightly higher in 1988 in both the spaced (2.3%) and control (4.7%) than in 1967 (1.0%). Hence, sanitation spacing would be recommended early (20 - 25 years) in the life of atropellis or gall rust infected stands.

- W. Martin, Prince Rupert Forest Region, Smithers.

Establishment of a Western White Pine Seed Production Area in the Vancouver Forest Region. Recently a 12 ha white pine seed production area (SPA) was established on central Texada Island, Sunshine Coast Forest District. The SPA was established in a 33 year old stand where many pine are expressing resistance to blister rust bole cankers through strong bark reactions or unusually slow canker development.

The establishment procedures involved a tree-by-tree evaluation for rust resistance mechanisms prior to roguing, thereby improving the stand composition of phenotypically resistant white pine.

Of the 667 white pine stems/ha; 454 are living; 212 trees or 31.8% dead, 198 trees or 59% lethally or non-lethally infected, and 77 trees or 1.5% expressed strong bark reactions or slow bole canker development. To quote Rod Martin, the Forest Resource Development Agreement (FRDA) contractor who established the SPA, he said, "I think you've got something special here...the significance cannot be overestimated." Furthermore he stated, "This stand (SPA) represents a major find and could shape the future of horizontal rust resistance breeding of white pine in British Columbia." The possibilities for the SPA are tremendous in providing operational seed supply and to the joint Forestry Canada - BCFS white pine resistance breeding program.

Plans are to obtain seed from open and controlled-cross pollinated trees. Western white pine is currently being planted as an alternate species on sites infected with laminated root rot in the Vancouver Forest Region.

- J. Beale, Vancouver Forest Region, Burnaby.

FOREST VEGETATION MANAGEMENT

Summary of Presentation to Integrated Vegetation Management Association Annual Workshop, January 25-26, 1989. Forest vegetation management treatments were applied to 49 550 ha in B.C. in 1987. Eighty percent of this activity (40 350 ha) involved the use of herbicides and 40% of the herbicides used for brushing and conifer release were applied aerially. Treatments were applied in most of the 21 major vegetation community types recognized in forest plantations of B.C. and to many of the 31 major non-crop species known to compete with conifers. Forest vegetation management activities occur in most of the 12 forested biogeoclimatic zones found in B.C. and may occur on a range of soil and site conditions.

To support operational needs, research is underway in five major areas:

- assessment of brushing needs;
- brushing hazard prediction;
- vegetation control methods;
- environmental impacts of vegetation management; and
- long-term consequences of treatments.

The Canada - British Columbia Forest Resource Development Agreement provided close to $1 million to support more than 40 vegetation management research projects in 1988/1989. In addition, the B.C. Ministry of Forests, Forestry Canada, forest industry, and other agencies have provided staff time and funding to support vegetation management research. Researchers and operational forestry staff from government, universities, and industry are involved in this research.

During 1989/1990, the final year of the Forest Resource Development Agreement (FRDA), emphasis is being placed on the communication of research findings to operational staff and the application of research results. Through FRDA and other initiatives a substantial amount of forest vegetation management research has been initiated. However, additional research is needed in many areas.

- P. Comeau, Research Branch, Victoria.

Reprints of Ministry Pamphlets and Reports. Five Ministry pamphlets and reports have been recently reprinted and are avai able from the author at 387-8905. A list of titles is as follows:

- Herbicide Use in Forest Management;
- Vision^{R} Use in Forest Management;
- Velpar^{R} Use in Forest Management;
- Managing Vegetation in Provincial Forests; and
- Herbicides and Forest Management in British Columbia.

- J. Boateng, Silviculture Branch, Victoria.

Forest Vegetation Problems, Chapter 13 Protection Manual, Vol. 2, Pest Management. Over the course of the last six months a summary chapter concerning forest vegetation problems and control has been completed by Protection Branch. This chapter was written in conjunction with the Silviculture Branch. The subject matter and manner of presentation does not duplicate existing information in the Silviculture Manual, specifically Chapter 12. The Protection Branch Manual Chapter summarizes information for staff not specialized in vegetation management and as well reviews administrative information not covered by the Silviculture Branch Manual Chapter. This new Protection Branch Manual Chapter should be available to Ministry staff in the next few months.

- J. Henigman, Protection Branch, Victoria.

Ecology, Responses and Utilization of Species Which Compete With Conifers in British Columbia: A Computerized Bibliography. This new draft report describes the structure and use of a computerized bibliographic database. The authors of the report are Comeau, P.G., Watts, S.B., Caza, C.L., Karakatsoulis, J., and S.M. Thomson. The computerized bibliography was developed to simplify the acquisition of reference materials by operational, research and extension staff. It contains citations and abstracts concerning the ecology, competitive status, responses and utilization of several plant species which compete with conifer seedlings in British Columbia.

A program is included with the database and facilitates searching and retrieval of references using dBASE III PLUS^{R}. The database files can be searched for references dealing with specific topics and citations and abstracts can be displayed on screen or on a printer. Users of the computerized bibliography must have an IBM-PC or compatible microcomputer and dBASE III PLUS program.

The species presently included in the database are: sitka alder, paper birch, pinegrass, fireweed, false azalea, white-flowered rhododendron, and thimbleberry.

Nine species will be added to the bibliography during the forthcoming year. Copies of reports listed in the bibliography are on file in the U.B.C. INFORMS Library and in Regional Offices of the B.C. Ministry of Forests.

- P. Comeau, Research Branch, Victoria.

RANGE PEST MANAGEMENT

Clearwater Forest District Cover Crop and Sheep Trials. Geoff Ellen of the Clearwater Forest District has completed a summary of four year's work on using sheep in combination with grass-legume seeding as a vegetation management tool. This is a review of a series of trials between 1985 and 1988 relating to questions of agroforestry. Supporting agencies to the studies include Thompson Nicola Sheep Graziers Association; Upper North Thompson Livestock Association; Moilliet and Findley; Ministry of Agriculture and Fisheries; Weyerhaeuser Canada Ltd., Vavenby Division; and the Ministry of Forests, Clearwater Forest District.

The trials involve the planning of prescription grazing, grass-legume seeding directly related to the growth and survival of competing vegetation and of 1-6 year old conifer plantations, and annual livestock weight gains. The first two years, 1985 and 1986, were aimed at examining the initial possibilities. Information from these first two years fine tuned the trial methodologies, grazing logistics and aspects of grass-legume seeding for 1987 and 1988 seasons. From a start of 30 head of sheep in seven electric fenced enclosures, we now have approximately 5,000 sheep in two separate flocks. They grazed 1 500 hectares of cutblocks involving 20 trial exclosures. We now have evaluations of the 30 one-half hectare plots over a spectrum of biogeoclimatic units and silviculture treatments. In addition, large portions of six cutblocks were seeded to compare conifer survival and growth parameters in relation to prescription grazing by cattle and sheep.

The overall objective is to provide useful, definitive information to staff who authorize cutting permits and preharvest silviculture prescriptions. If we do find significant positive plantation responses in relation to grass-legume seeding alone or in combinations with grazing, then food production can be enhanced and brushing and weeding costs can be reduced.

- D. Campbell, Integrated Resources Branch, Victoria.

Tordon Fact Sheet. The Pesticide Advisory Committee (PAC) has completed a new fact sheet on Tordon 22K which is a herbicide used mainly in range applications for containment of diffuse and spotted knapweeds. The format of this fact sheet is slightly different in that a description of the knapweed problem preceeds the technical characteristics of the herbicide. There are four new fact sheets underway to compliment the existing series. These will mainly be joint silviculture/range projects and will cover the following topics:

- the use of 2,4-D in forest management,
- the use of biological methods in forest and range management,
- the use of physical methods in forest and range management, and
- the use of prevention techniques in forest and range management,

- D. Campbell, Integrated Resources Branch, Victoria.

PESTICIDES

"A Quick Guide to Pesticides". This newly revised 1989 edition is now available from the Protection Branch. This popular field guide now contains four new major forest pesticide fact sheets on benomyl, chlorothalonil, captan and picloram. Other sections and tables throughout the guide have been updated and revised in response to comments and suggestions from the Pesticide Action Committee, Silviculture Branch, Forestry Canada, Forest Service regional offices and other individuals.

- P. Humphreys, Protection Branch, Victoria.

Pesticide Videotapes. Videotapes on a variety of pesticide related topics are available from Protection Branch. Some of the titles include "Getting Our Act Together" (B.t. application in Paul Lake Park), "Pesticide Control and Regulations," "The Safe Application of Herbicides," and "B.t. in B.C." If you wish to borrow any of these productions, please contact Pat Humphreys at 387-8737. A complete listing of titles and running times is included in the videotapes section of this issue.

- P. Humphreys, Protection Branch, Victoria.

Pre-attack Injection of MSMA Against Mountain Pine Beetle. In the Vanderhoof Forest District in 1988, replicates of lodgepole pine were baited with mountain pine beetle semiochemicals and injected with 1/4 strength MSMA (80 g/L Glowon^{R} at various times prior to the mountain pine beetle flight. Final efficacy samples will be conducted in late May, 1989 in order to determine if 1/4 strength MSMA is sufficiently toxic to prevent brood maturation. Based on these results, a further trial will be undertaken this summer to optimize the timing and dosage of the pre-attack injection technique on lodgepole pine. If successful, this strategy could extend our "window" of MSMA applications by 3-4 weeks in the summer.

- R. Hodgkinson, Prince George Forest Region, Prince George.

Acephate and Oxydemeton-methyl Stem Implants for Sitka Spruce Weevil Control. A trial to test both acephate and oxydemeton-methyl implants in healthy weevil infested Sitka spruce plantations within Tree Farm License 19 is in progress. Within each of three plantations, 20 trees were treated with Acecap-97^{R} capsules (a commercially available capsule containing acephate), 20 trees were treated with Gel-cap^{R} capsules containing oxydemeton-methyl, and 20 trees which were assessed as having a high probability of being attacked in the year of treatment were selected. The objective is to test if injected systemic insecticides will prevent Pissodes strobi infestation in Sitka spruce leaders. The efficacy of each treatment will be determined by comparing the mean attack treatment trees to the mean attack of the controls.

Results after the first year of attack will be reported in the fall issue.

- D. Heppner, Vancouver Forest Region, Burnaby, and G. Fraser, Canadian Pacific Forest Products Ltd., Qualicum Beach.

Garlon 4E[R] Update: Dow Chemicals Canada Inc. indicate that their new herbicide should be fully registered in forestry for application by aerial or ground techniques. Their rights-of-way registration is expected later this year. Apparently all outstanding environmental studies needed for Garlon registration have been completed and are now being reviewed by Agriculture Canada and their advisors.

In B.C. there are currently 24 research trials with Garlon 4E underway mainly involved with efficacy assessment. Most competing brush species of importance in the province are included in the trials. For more information about Garlon registration contact the author.

- J. Henigman, Protection Branch, Victoria.

Escort[R] Herbicide Registration Update. Dupont Canada Inc. indicate that their new herbicide should receive a forestry registration in 1991-92. Escort, also known as Ally , is currently registered in agriculture. Forestry Canada are undertaking a variety of environmental fate trials which will contribute to the registration in forestry.

In B.C. there are currently 24 research trials with Escort underway mainly involved with efficacy assessment. Most competing brush species of importance in the province are included in the trials. For more information about Escort registration contact the author.

- J. Henigman, Protection Branch, Victoria.

Pesticide Registration Updates for Seed Orchards. The fungicide ferbam is now available only as water dispensable granules (Ferbam 76WDG[R]) rather than as a wettable powder. Efficacy tests have been completed for this new formulation and it is now registered for use against interior spruce cone rust, Chysomyxa pirolata in seed orchards.

Bayleton 50% WP[R] is also effective against this disease and an application for minor use registration is being considered by the manufacturer.

- D. Summers, and B. McEntire, Silviculture Branch, Victoria.

PEST MANAGEMENT PERSONNEL
Forest Service Personnel fully or partly committed to forest pest management activities

Protection Branch			
R.F. (Bob) DeBoo	Manager, Pest Management	Victoria	387-8740
P.M. (Peter) Hall	Forest Entomologist	Victoria	387-8742
J.F. (John) Henigman	Pesticide Specialist/ Vertebrate Animal Specialist	Victoria	387-8738
J.A. (John) Muir	Forest Pathologist	Victoria	387-8739
S.P. (Stuart) Taylor	Pest Management Technician	Victoria	387-8743
P.J. (Pat) Humphreys	Pest Management Technician	Victoria	387-8737
Silviculture Branch			
M. (Mike) Wyeth	Silviculturist	Victoria	387-8922
J. (Jacob) Boateng	Brushing and Weeding Specialist	Victoria	387-8905
Vacant	Technician-Stand Tending	Victoria	387-8912
D. (Don) Summers	Seed Production Pest Management Officer	Victoria	387-3931
B. (Bev) McEntire	Seed Production Pest Management Technician	Victoria	387-8938
G. M. (Gwen) Shrimpton	Nursery Pest Management Officer	Surrey Nursery	576-9161
Cariboo Forest Region			
Regional Staff			
M. W. (Mark) Hamm	Pest Management Forester	Williams Lk.	398-4441
L. J. (Leo) Rankin	Forest Entomologist	Williams Lk.	398-4439
D. F. (Don) Doidge	Specialist, Forest Pathology	Williams Lk.	398-4442
J. (Jane) Perry	Stand Tending Forester	Williams Lk.	398-4400
C. (Chris) Easthope	Range Agrologist	Williams Lk.	398-4396
District Staff			
R. (Richard) McKay	Resource Officer Protection	Chilcotin	394-4215
J. (John) Hoyrup	Resource Officer Protection	Horsefly	620-3417
D. (Dennis) Asher	Resource Officer Protection	Quesnel	992-4400
W. (Wayne) Hendy	Resource Officer Protection	Williams Lk.	398-4341
A. (Alec) Wallach	District Pest Management Coord.	Williams Lk.	398-4341
M. (Mel) Dodge	Resource Officer Protection	100 Mile House	395-3812
Kamloops Forest Region			
Region Staff			
L. (Lorraine) Maclauchlan	Forest Entomologist	Kamloops	828-4177
H. (Hadrian) Merler	Forest Pathologist	Kamloops	828-4176
R. (Ron) Gray	Stand Tending Forester	Kamloops	828-4163
R. (Rick) Tucker	Ranger Planning Agrologist	Kamloops	828-4582

District Staff

M. (Mike) Hall	Resource Assistant	Clearwater	674-2265
D. (Dave) Piggin	Resource Assistant	Kamloops	372-5832
M. (Margo) Hollinger	Resource Assistant	Lillooet	256-7531
T. (Tom) Lacey	Resource Officer Protection	Merritt	378-9311
H. (Harry) Spahan	Resource Assistant	Merritt	378-9311
J. (Jim) Mottishaw	Resource Assistant	Penticton	492-8721
D. (Dave) Procter	Resource Officer Protection	Salmon Arm	832-7153
J. (Jim) Wright	Resource Assistant	Salmon Arm	832-7153
E. (Eric) Haupt	Resource Assistant	Vernon	542-0264

Nelson Forest Region

Region Staff

E. (Ernie) Morris	Pest Management Specialist	Nelson	354-6144
D. (Don) Norris	Forest Pathologist	Nelson	354-6143
G. (Gerald) Reichenback	Stand Tending Forester	Nelson	354-6280
J. (Jack) King	Range Officer	Nelson	354-6243

District Staff

D. (Dan) Reiben	Pest Management Officer	Arrow	365-2131
R. (Ross) Elliott	Pest Management Officer	Boundary	442-5411
A. (Art) Krane	Pest Management Officer	Cranbrook	426-3391
L. (Larry) Hewlett	Resource Officer - Protection	Golden	344-7500
S. (Emile) Begin	Pest Management Officer	Invermere	342-4200
J. (Jim) Schafthiezen	Pest Manager Officer	Kootenay Lk.	825-4415
A. (Archie) McConnachie	Resource Officer - Protection	Revelstoke	837-7611

Prince George Forest Region

Region Staff

R.S. (Bob) Hodgkinson	Forest Entomologist	Pr. George	565-6122
(Vacant)	Pest Management Forester	Pr. George	565-6122
(Vacant)	Forest Patholologist	Pr. George	565-6122
R.F. (Rob) Bowden	Stand Tending Forester	Pr. George	565-6191

District Staff

P. (Paul) Gevatkoff	Resource Officer - Protection	Dawson Cr.	784-2350
R. (Rick) Grayston	Resource Assistant - Protection	Dawson Cr.	784-2350
R. E. (Roy) Simpson	Resource Officer - Protection	Ft. Nelson	774-3936
L. (Lance) Mitchell	Resource Officer - Protection	Ft. St. James	996-7131
P. (Perry) Corley	Resource Assistant - Protection	Ft. St. James	996-7131
A.R. (Al) Kneeland	Resource Officer - Protection	Mackenzie	997-3310
D. (Don) Courson	Resource Officer - Protection	Ft. St. John	787-3483
R.G. (Roger) Wiltsie	Resource Officer - Protection	McBride	569-2265
A.D. (Dale) Cinnamon	Resource Officer - Protection	McBride	569-2265
F.L. (Fred) Turner	Resource Officer - Protection	Pr. George	562-4121
B.L. (Bruce) Doerksen	Resource Assistant - Protection	Pr. George	562-4121
M.F. (Mike) Dittaro	Acting Resource Officer - Prot.	Vanderhoof	567-6363
M.B. (Mike) Pritchard	Resource Assistant - Protection	Vanderhoof	567-6363

Prince Rupert Forest Region

Region Staff

S. (Steve) Schmidt	Acting Protection Officer	Smithers	847-7477
T. (Tim) Ebata	Forest Entomologist	Smithers	847-7479
W. (Wayne) Martin	Forest Pathologist	Smithers	847-7478
F. (Fred) Newhouse	Stand Tending Forester	Smithers	847-7514
D. (Don) Russell	Range Officer	Smithers	847-7443

District Staff

W. (Bill) Jensen	Resource Officer - Protection	Bulkley	847-7555
G. Gordon Munroe	Resource Officer - Protection	Cassiar	771-4211
J. (Joe) Katasonoff	Resource Officer - Protection	Kalum	638-3302
K. (Kas) Kopec	Resource Assistant - Protection	Kalum	638-3290
B. (Brian) Atherton	Resource Officer - Protection	Kispiox	842-6581
W. F. (Bill) Davidson	Resource Officer - Protection	Lakes	692-2223
B. (Brian) Simpson	Resource Officer - Protection	Morice	845-6288
S. (Steve) Mitchell	Resource Assistant - Protection	Morice	845-7712
W. T. S. (Bill) Jackson	Resource Officer - Protection	North Coast	627-0457

Vancouver Forest Region

Region Staff

D. G. (Don) Heppner	Forest Entomologist	Burnaby	660-7653
J. D. (Jeff) Beale	Forest Pathologist	Burnaby	660-7654
M. (Mel) Scott	Stand Tending Forester	Burnaby	660-7579

District Staff

T. (Terry) Preston	Resource Officer - Protection	Campbell River	286-3282
T. (Tim) Ewart	Resource Assistant - Protection	Campbell River	286-3282
G. (Greg) Hemphill	Resource Officer - Protection	Chilliwack	794-3361
G. (Grant) Preston	Resource Assistant - Protection	Chilliwack	794-3361
W. (Willie) Giesbrecht	Resource Assistant - Protection	Chilliwack	794-3361
P. (Pat) Hayes	Resource Officer - Protection	Duncan	746-5123
D. (Dennis) Tippie	Resource Officer - Protection	Mid Coast	982-2621
W. (Wade) Matheson	Resource Assistant - Protection	Mid Coast	982-2621
D. (Dan) Powell	Resource Officer - Protection	Pt. Alberni	724-9205
D. (Doug) Walker	Resource Assistant - Protection	Pt. Alberni	724-9205
C. (Clarence) Friesen	Resource Officer - Protection	Pt. McNeill	956-4416
T. (Tim) Neal	Resource Assistant - Protection	Pt. McNeill	956-4416
B. (Barry) Millar	Resource Officer - Protection	Powell River	485-9831
R. (Ron) Diprose	Resource Assistant - Protection	Powell River	485-9831
D. (Debbie) Anderson	Resource Assistant - Protection	Powell River	485-9831
R. (Rick) Machowski	Resource Officer - Protection	Qn. Char. Is.	559-8447
B. (Brian) Eccles	Resource Assistant - Protection	Qn Char. Is.	559-8447
K. (Keith) Davis	Resource Officer - Protection	Squamish	898-9671

MEETINGS

ACAFA Symposium and Trade Fair Postponed. The comprehensive symposium and trade fair scheduled for Winnipeg in October has been postponed until October 8-12, 1990. This event is being organized by the National Research Council's Associate Committee on Agricultural and Forestry Aviation. Features include an international array of speakers addressing the topic "Industries' Future Needs." British Columbia is expected to have an outstanding role, and contributions from both the Forest Service and the private sector are expected. Please contact the undersigned for additional information.

- R.F. DeBoo, Protection Branch, Victoria.

Symposium on Integrated Forest Protection. Over 200 foresters, technicians, and managers attended a two-day symposium on the management of insect pests, weeds, vertebrate pests, and diseases affecting forests of the U.S. Northwest. One interesting feature was the announcement of a degree program in Integrated Forest Protection at Oregon State University. Contact Prof. Jack Walstad, Dept. of Forest Science, College of Forestry, Oregon State University, Corvallis, Oregon, 97331, for details.

- R.F. DeBoo, Protection Branch, Victoria.

Pest Damage Appraisal Advisory Committee (PDAAC). On March 9th, this committee held a meeting in Victoria to approve and discuss a variety of damage appraisal topics as follows:

a) PDAAC Strategic Plan (1989-1994). The intent of this plan is to facilitate the incorporation of pest impacts into Timber Supply Area plans, with other benefits being the increased availability of site prescription and educational tools. Implementation is now the responsibility of the Protection Branch;

b) Ranking Pest Damage Appraisal Priorities. This report ranks the damage appraisal research needs of the Ministry for twenty-five major pests. The top two categories, containing nine pests, have been identified for immediate action. Currently work is ongoing for five of these pests with projects and funding being developed for the remainder;

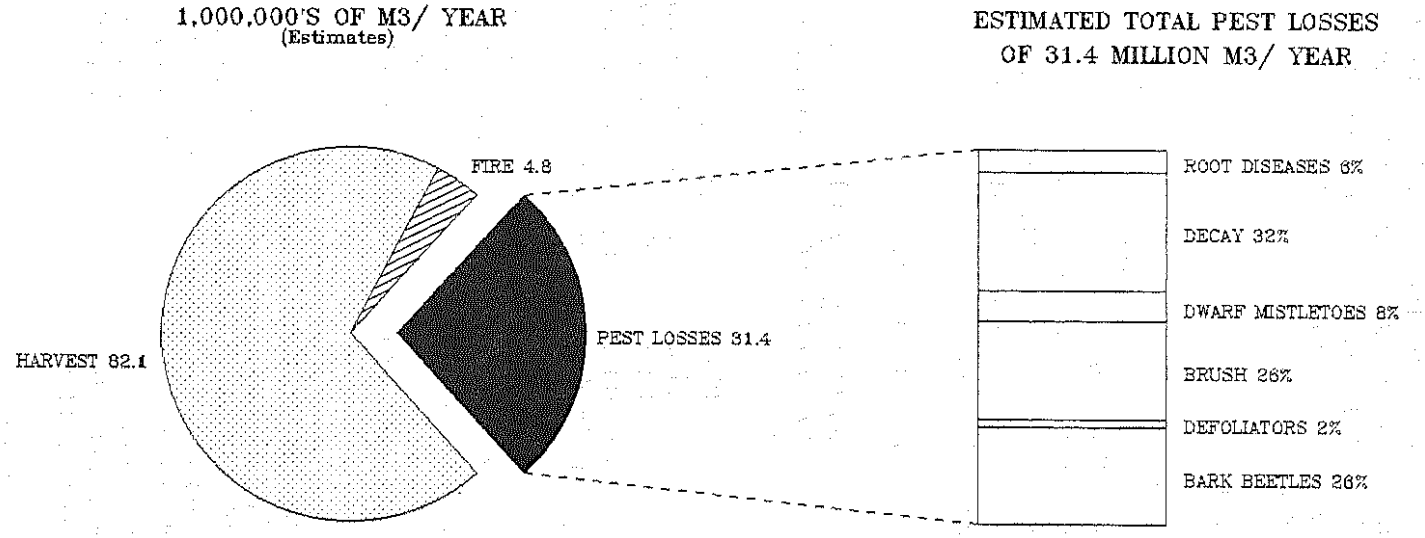
c) Collection of pest information from permanent sample plots - PSP's (Past and Future). Standardized pest codes have been developed to ease the burden of identifying and quantifying pest damage on PSP's. These codes are also being considered by the Silviculture Branch and Forest Productivity Council for inclusion into their survey standards. Further, a subcommittee has been established to develop recommendations on the collection of pest information from previously established PSP's; and

d) PDAAC's Terms of Reference were revised.

Future PDAAC activities will likely entail annual review of a) and b), and the undertaking of special damage appraisal projects/topics as the need arises. More information on PDAAC and its activities are available from either author.

- S. Taylor, Protection Branch, Victoria, and D. Hutcheson, Kamloops Forest Region, Kamloops.

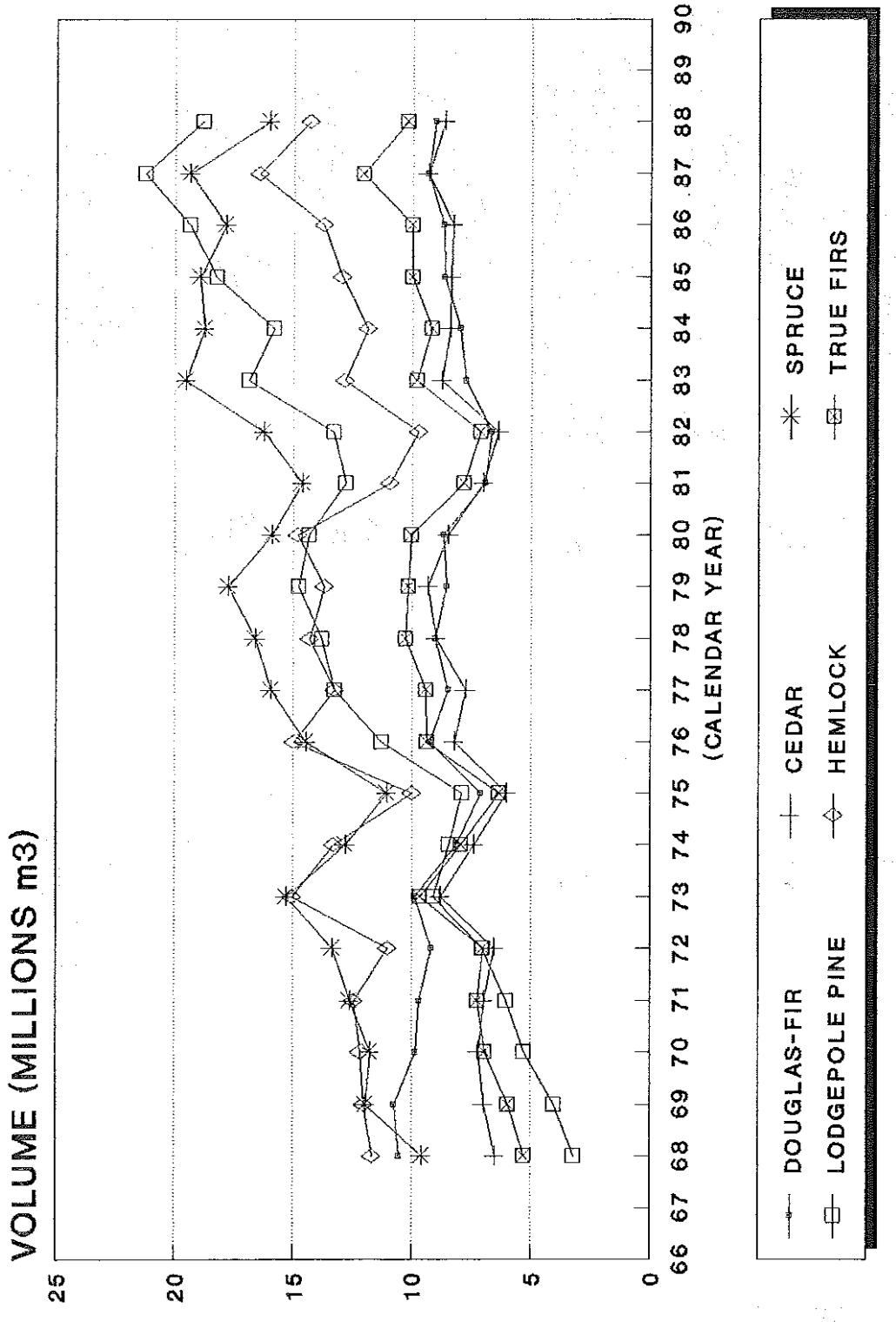
BRITISH COLUMBIA
ANNUAL TIMBER HARVEST, FIRE & PEST LOSSES
(GROSS), 1984–1988



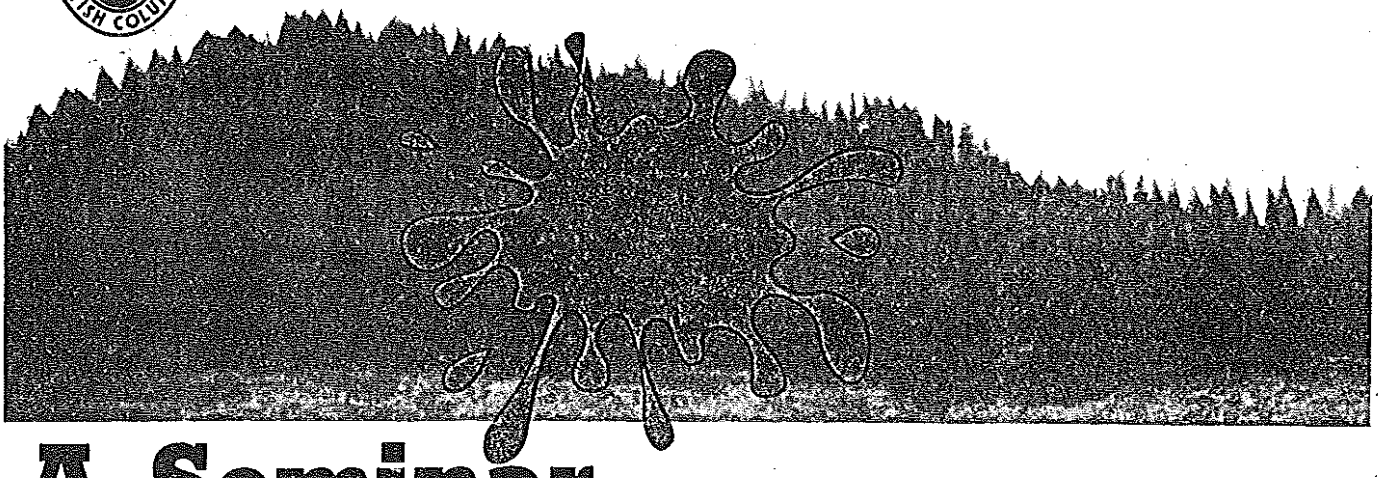
SOURCE: CFS & BCFS

1 Annual harvest is for the period 1984–1988

TABULATIONS AND GRAPHICS



British Columbia Forest Service



A Seminar. . .
YOU and FOREST PESTS

DATE: TIME:
PLACE:

Bring your

- PROTECTION MANUAL - VOL. II - PEST MANAGEMENT
- QUESTIONS AND CONCERNS
- SUGGESTIONS

AGENDA

An article discribing this Seminar Series is present on page 4

Continuing Education Credits will be given by —

ASIT — APPLIED SCIENCE TECHNOLOGISTS and TECHNICIANS

RPF — ASSOCIATION OF BRITISH COLUMBIA PROFESSIONAL FORESTERS

Endorsments -

- COUNCIL OF FOREST INDUSTRIES OF BRITISH COLUMBIA.
- PROFESSIONAL PEST MANAGEMENT ASSOCIATION OF BRITISH COLUMBIA

A Quick Guide to Pesticides

Use and Regulation in B.C. Forest Management

January 1989
(Revised)

Ministry of Forests

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JAN. 1989 (REV.)

A new revised publication available from the Protection Branch, see page 28 for an article on this publication.

PUBLICATIONS AND REPORTS

British Columbia Ministry of Forests, 1989. A quick guide to pesticides. Use and regulation in B.C. forest management. Revised Jan. 1989, Min. For. unnumbered field guide, 53 pp.

DeBoo, R.F., R.G. Christie, B.J. van der Kamp, and G.E. Miller, 1988. A discussion paper on the future of forest pest management in British Columbia. A paper presented to the Forest Pest Review Committee of B.C., unpublished, 12 pp. (Copies available from senior author).

Joy, K., J. McLean, G. Fraser, and D. Summers, 1988. Committee report on the future of forest pest management in British Columbia. A report on the response to the discussion paper (DeBoo, et al. 1988) presented to the Forest Pest Review Committee of B.C., unpublished, 9 pp. (Copies available from the senior author or from R.F. DeBoo).

VIDEOTAPES

The following videotapes are available from the Protection Branch, please contact Pat Humphreys at 387-8737 to arrange for loans.

INSECTS, PESTS, AND DISEASES

TITLE	FORMAT	RUNNING TIME
Armillaria Root Disease	VHS	11m/58s
Crisis Prevention (Gypsy Moth Eradication)	VHS	Unknown
The Gypsy Moth: A Dilemma	VHS	Unknown
The Hidden Enemy - Root Rot Technology Transfer	VHS	23m/40s
Knapweed - Seeds of Destruction	VHS	24m/20s
Laminated Root Rot	VHS	13m/6s
Laminated Root Rot Identification and Detection in Rehab. Areas	VHS	12m/38s
Lodgepole Pine Dwarf Mistletoe	VHS	12m/12s
Moth Eaten (2 copies)	VHS	Unknown
Phellinus weirii - Root Rot Control	VHS	Unknown
Pine Beetle	VHS	5m
Reversing the Trend (Budworm)	VHS	33m
The Trouble with Weeds (2 copies)	VHS	10m/3s
Western Hemlock Dwarf Mistletoe	VHS	10m/32s
Western Spruce Budworm	VHS	Unknown

PESTICIDES AND PEST CONTROL

TITLE	FORMAT	RUNNING TIME
Agent Orange Comes Home	VHS	Unknown
Getting Our Act Together (Paul Lake Park)	VHS	15m
Getting our Act Together (Spruce Budworm)	VHS	17m/47s
Herbicide Abuse in NB (5th Estate)	VHS	Unknown
Herbicides (2 copies)	VHS	16m/30s
Jackpine Budworm Spray, 1985	VHS	Unknown
Operational Trial (B.t.) - Paul Lake Park	VHS	30m
Pesticide Control and Regulations (2 copies)	VHS	16m/37s
Pesticides in Forestry (The Essential Edge)	VHS	17m
Raid Contre La Tordeuse (English)	VHS	Unknown
The Safe Application of Herbicides (2 copies)	VHS	10m/3s
B.t. in B.C. (4 copies)	VHS	13m

THE FOREST AND ITS MANAGEMENT

TITLE	FORMAT	RUNNING TIME
Fire in the Forest	VHS	7m
Forest Protection - Challenge for the Future	VHS	26m
Forest Report 1986	VHS	60m
Forestry in Perspective	VHS	13m
Forests for all Uses	VHS	8m/5s

TITLE	FORMAT	RUNNING TIME
History; FOREM Forestry; Harvest and Manufacturing	VHS	7m/35s; 5m/25s; 7m/35s
Improving the Investment	VHS	7m
Investing for the Future	VHS	10m
Managing the Investment for the Future	VHS	Unknown
Protecting the Investment	VHS	10m
Sheena Journal - Forestry, Vegetation Management	VHS	Unknown

OTHER SUBJECTS

TITLE	FORMAT	RUNNING TIME
Caterpillar Clearing Land (de-stumping) (2 copies)	VHS	Unknown
Golden Tree-Pushing Root Rot Trial 1987	VHS	Unknown
Paul, Phelan & Perry Crop Protection	VHS	4m/24s
Stump Puller - Shawnigan Lake (2 copies)	VHS	Unknown

The following videotapes are available from the Silviculture Branch, please contact Debora Tarry at 387-8907 to arrange for loans.

TITLE	FORMAT	RUNNING TIME
B.t. in B.C.	VHS	Unknown
Cone Collection Pre-Organization 1983	VHS	Unknown
Cone Collection Methods 1983	VHS	Unknown
Cone Handling & Storage 1983	VHS	Unknown
Cone Crop Forecasting 1983	VHS	Unknown
Cone Crop - Seed Evaluation 1983	VHS	Unknown
Cone Crop Survey 1983	VHS	Unknown
Fighting Forest Fires 1987	VHS	Unknown
Fire in the Forest 1987	VHS	7m
Forestry in Perspective 1987	VHS	13m
Forests for all Uses 1987	VHS	8m/5s
Improving the Investment	VHS	7m
Investing for the Future 1987	VHS	10m
Knapweed Seeds of Destruction 1987	VHS	24m/20s
Major License Silviculture Information System (MLSIS) 1989	VHS	17m
Managing the Data	VHS	Unknown
Managing the Investment for the Future 1987	VHS	10m
Mechanical Site Preparation 1988	VHS	49m
Planting Quality Inspection 1986	VHS	Unknown
Protecting the Investment 1987	VHS	Unknown
Reforestation - Catching Up	VHS	Unknown
Safe Application of Herbicides 1987	VHS	10m/03s
Seedling Care: Everyone's Concern 1989	VHS	17m
Skeena Journal Forestry, Vegetation Management	VHS	Unknown
Surveys: The Measurement of Success 1989	VHS	Unknown
Trouble with Weeds 1987	VHS	10m/03s