Province of
British Columbia
Ministry of
Forests

PEST MANAGEMENT PROGRESS

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

Volume IX, Number 1 (File 190-4 PMP) May, 1990

PEST MANAGEMENT

FOREST HEALTH PROGRAM

1980 - 1990

HAPPY ANNIVERSARY !

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DK-1057

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. Pest Management Progress 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

The First Ten Years. This year, 1990, marks ten years of the active practice of our discipline in the B.C. forest management mainstream. From a humble start with a branch forester, an auxiliary assistant, and some ad hoc involvement of field staff and Canadian Forestry Service scientists, we have grown to a group of about 50, fully dedicated to pest management and a comprehensive program of forest health.

In our first decade we have seen the evolution of policies, procedures and guidelines, the implementation of a comprehensive bark beetle management program which has expended nearly $50 million, and the realization of tremendous gains from root disease control and other forest health treatments.

Much more needs to be done in the years ahead, especially to prevent problems, through cooperative planning and comprehensive prescriptions. Our next decade should bring much satisfaction and many rewards. Keep up the good work out there!

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

Forest Health Treatment Analysis. A draft report on an economic analysis of several forest health/pest management treatments, such as stumping for control of a root disease, has been circulated to Ministry staff for comment.

Several suggestions were made, and an extensive revision is being undertaken. The methods of financial analysis are being re-examined, and more detailed descriptions and documentation of the treatments are planned. A revised report is planned by the Fall of 1990, depending on the outcome of current discussions. Several branch and regional staff are preparing the treatment rationales, including collation of data to show the opportunities to either preserve timber or enhance the growth and yield of young stands.

- J. Muir, Protection Branch, Victoria.

PHSP's and Pests. Work is continuing with region and branch staff on development of pest risk assessments required as part of the pre-harvest silviculture prescription (PHSP).

A working group of regional staff is reviewing the progress to date, and will recommend procedures for insect pests, field guides, and improvements to the current recommendations. The goal is to have readily available information and advice for the general forest practitioner who is preparing the PHSP's.

- J. Muir, Protection Branch, Victoria and Regional Forest Health staff.

Forest Health Interpretations Working Group. A Forest Health committee of the interpretations working group organized by Research Branch is planning to determine and develop appropriate field guides or other materials to facilitate implementation of forest health/pest management recommendations.

A contract problem analysis is anticipated in April-May 1990, followed by projects in one or more regions. It is expected that most of the work will involve compilation of available information and current regional guidelines. Practical field guides, possibly in the format of the ecological classification handbooks, will be emphasized.

- J. Muir, Protection Branch and G. Krumlik, Research Branch, Victoria.

PHSP Pest Slide Show. At the request of Silviculture Branch, a slide show was prepared for the pre-harvest silviculture prescription (PHSP) course to identify the important pests that field workers may encounter, and should consider, in developing a PHSP.

Copies of the 40-slide package should be available in May, 1990, from P. Diggle, Silviculture Branch. Protection Branch will provide a set for each regional forest health group.

- J. Muir, Protection Branch, Victoria.

Forest Health Pest Damage/Growth and Yield Program. In conjunction with the Pest Damage Appraisal Advisory Committee (PDAAC), and at the request of the Coastal and Interior Forest Productivity Councils, Protection Branch and regional specialists have been planning projects related to the growth and yield goals and objectives of the councils.

Several cooperative projects with inventory and silviculture staff are planned to establish new long-term plots, and to re-measure established plots to determine the effects of pests on tree growth.

A general program for cooperative work has been proposed to the councils, and regional coordinating committees are being organized to facilitate the various growth and yield projects.

- J. Muir, Protection Branch, Victoria.

Update on Inventory/Protection/Silviculture Cooperative Projects.

The following work has been accomplished in 1989:

PEST CODES: Minor adjustments have been made to the pest codes on inventory permanent sample plot field sheets.

PROGNOSIS: The PROGNOSIS growth simulator, for application in all-age interior Douglas-fir stands, has been updated. Revisions include:

- user-friendly control and keyword files;
- PC level application (AT+);
- calibration with 150 PSP data;
- insertion of new, stem-analyzed interior Douglas-fir site curves;
- correlation work to equate BEC and Daubenmire habitat types for IDF, ICH, ESSF and MS biogeoclimatic zones to the variant level.

Copies will be sent out to regions and selected agencies in late April for testing and review.

1990 work on PROGNOSIS will include:

- insertion of 1988 Kozak taper equations;
- calibration of the model for the southern portion of Province for:
  - pure species management,
  - mixed species management,
  - even and uneven-age management,
  - appropriate ecological/site index linkages.

Development of the PROGNOSIS model is a joint cooperative project involving Protection, Silviculture, and Inventory Branches.

- J. Vivian, Inventory Branch, Victoria.

Silviculture Systems and the Implications to Forest Health Treatments. For those of you not steeped in silviculture lore, silviculture systems are not computer systems, they are basic stand management methods, culminating in a harvesting method which could be clearcutting, shelterwood, or selection (not selective) cutting. There is a whole set of jargon for you and your colleagues to abuse and misunderstand. As a result of some rather substantial public pressure, the Ministry of Forests is undertaking a problem analysis and literature review of all relevant silviculture systems currently practised in the world in order to identify which systems could be applied in B.C. Obviously we know that clearcutting works well and we, in Forest Health, have structured almost all of our pest management recommendations around clearcutting and even-aged stands.

The specter looms that in the future we will be faced with shelterwood and uneven-aged selection cutting stands in need of pest treatments. Our pest management recommendations for these stand management regimes will have to be developed. In some cases, pest problems, particularly disease problems, will be severely aggravated by these silviculture systems and we may not have ready solutions.

The problem analysis and literature survey will soon be presented as a report to the director of Silviculture Branch on behalf of the Silviculture Systems Steering Committee. It is proposed that, following the report review, a working committee be formed to identify how various systems could be implemented in the province, and what problems require solutions. The director of Protection Branch, Jim Dunlop, is a representative on the steering committee. I will advise Jim on technical issues and will initiate and take part in working committees that would be relevant to pest management concerns. This project could have some very interesting challenges.

- J. Henigman, Protection Branch, Victoria.

Silviculture Systems Steering Committee. Silviculture is the art and science of managing trees to meet the objectives of forest owners. Within silviculture there are a number of silvicultural systems which can be used to achieve these objectives. A silvicultural system is the coordinated set of management actions which encompass harvesting, regeneration and management of a forest stand.

The Forest Service has established a Silvicultural Systems Steering Committee which is responsible for developing and coordinating a province-wide program of research, demonstration and implementation of all silvicultural systems. The committee is composed of one executive representative, seven branch directors, and the silviculture issues forester who is responsible for implementing the program.

The committee has commissioned a provincial problem analysis, which will be available shortly, and will determine the future direction of silvicultural system research and practice. Each forest region is initiating programs as well.

One area of interest in regard to silvicultural systems is forest health. Insect and disease problems must be considered, since silvicultural systems, other than clearcutting, leave residual trees. Maintaining residual trees after the initial harvest will present a significant challenge for forest health staff to mitigate these problems. The Steering Committee will ensure that forest health issues are incorporated into any provincial program.

For more information please contact Warren Mitchell at Silviculture Branch.

- W. Mitchell, Silviculture Branch, Victoria.

Sketch Mapping Plans for 1990 in the Prince George Forest Region. Sketch mapping will be undertaken by Forest Service staff in the Vanderhoof, Fort St. James and Prince George Forest Districts in 1990. Sketch mapping contracts will be tendered in the Robson Valley and Mackenzie Forest Districts. Most of the maps will use a scale of 1:50 000. This new stock of sketch maps will be produced to record disturbances over the last three years.

- S. Taylor, Prince George Forest Region, Prince George.

Pest Training on Plantation Pests. Nine training sessions have been scheduled for the spring and fall in the Prince George Forest Region. The sessions are intended to help Ministry of Forests staff, licensees, and consultants become familiar with the identification and management of important plantation pests. Each session will be field-oriented, last for one day (with two exceptions), and be taught by region and district staff.

- S. Taylor, Prince George Forest Region, Prince George.

Summer Student Assistants for The Prince George Forest Region. Two student assistants have been hired by the Prince George Forest Health Section for various projects this summer. A co-op student from the University of Victoria will assist the regional pathologist and pest management forester in various disease surveys and installations. A student from Selkirk College will assist the regional entomologist and pest management forester in several insect sampling and operational control programs. This is the third year that summer students have been hired to help forest health staff in the Prince George Forest Region with various projects and surveys during the busy field season.

- R. Hodgkinson, R. Reich, S. Taylor, Prince George Forest Region, Prince George.

Prince Rupert Forest Health Section Conducts Training Sessions. Tim Ebata, Bill Young, and Stefan Zeglen of the Prince Rupert Forest Region, are currently visiting each of the district offices in the region. District and licensee staff are being instructed in the basics of forest pest identification and management strategies. Further field-orientated instruction will follow in the summer months.

- W. Young, Prince Rupert Forest Region, Prince Rupert.

An Integrated Forest Health Program. The Kamloops Forest District has been developing a comprehensive Forest Health Program by preparing a district Forest Health Plan, with input from the Silviculture and Timber Harvesting Programs. The plan is currently in draft form and should be approved by the District Management Team in the near future.

The plan details the roles of various program managers in the district and allows the forest health technician to give input directly into each pre-harvest silviculture prescription (PHSP) developed by the Small Business Forest Enterprise Program and the major licensees. The plan will also be a mechanism whereby the Forest Health Program can provide input into silviculture prescriptions (SP's). Pest incidence data, collected from various PSHP's, SP's and silviculture surveys, have proven to be very beneficial in developing a forest health pest incidence data base (Microsoft EXCEL) for the District.

- D. Piggin, Kamloops Forest District, Kamloops.

Management and Working Plan Pest Management Outline. A revision to the format of Section 2.262 (Pests), for Management and Working Plans, in the Cariboo Forest Region, has been incorporated in the plan outline. The intent of the revision is to elicit specific management commitments to detection, appraisal, and management of pests occurring in major licensee interest areas, including pest risk assessment, and management at the time of the pre-harvest silviculture prescription.

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

Cariboo Aerial Pest Survey. Regional protection staff will join efforts with district resource assistants this summer to sketch map pest damage over the entire Cariboo Forest Region. Fire, timber, and pest management specialists, plan to cooperate with licensee representatives, in an attempt to upgrade the quality of the survey at minimum cost.

Aerial photography will also be used, where pest damage is severe, to increase ground detection efficiency.

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

Pest Management Training. One-day training sessions will be held this June with all Cariboo Forest Districts, as well as with major licensees and consultants. Instruction will be tailored to the particular district or interest area, concentrating on the three or four pests of most concern. A field tour of pest incidence and management areas will also be included.

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

Pre-harvest Silviculture Prescription (PHSP) Pest Risks. A procedure for evaluating pest risk assessment performed as part of the protection section of the PHSP is being used in the Cariboo Forest Region. The procedure references a list of significant pest risks by biogeoclimatic subzone. Its components are:

(1) the absence or presence of pest species at the time of the PHSP;
(2) the assessment of pest risks prior to the free-growing stage;
(3) the assessment of pest risks over the life of the new stand; and
(4) an outline of actions proposed for management.

Initial implementation is expected in April. Comments or suggestions are welcomed.

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

Forest Health Audits in the Prince George Forest Region. The Forest Health Section in the Prince George Forest Region recently completed audits in the Fort St. James and Mackenzie Forest Districts. The Fort St. James audit examined mountain pine beetle detection, control strategy planning, and control programs. The audit included a half-day helicopter inspection of infested areas and single-tree disposal sites. The Mackenzie audit examined the district's aerial and ground pest detection program over the past two years. Both district offices and the region benefitted from the audits, through improved mutual understanding, and the affirmation of strategies, goals, and expectations. Lists of questions addressed during the audits, are available, on request, for others contemplating similar program reviews.

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

Sleuthing for Pests...on a Map Sheet Basis. As per the Kamloops Forest Region strategy, the Lillooet Forest District has undertaken an all-pest survey on two map sheets in the north-west corner of the district. The survey was stratified by forest cover information, and a representative sample of types was assessed by contract. Results will become available soon, and the pest information will be combined with other digital inventory data. The district is confident that they are well on their way to better forest health knowledge.

- M. Hollinger, Lillooet Forest District, Lillooet

New! Field Guide to Pests of Managed Forests. A much awaited and very useful field guide to pests of managed forests in British Columbia (B.C. Ministry of Forests and Forestry Canada Joint Publication No. 16) is now available to field and operational forestry personnel. The purpose of this guide is to assist field personnel in the identification of injurious insects, diseases and other agents. The handbook is divided into four main sections: insects, diseases, abiotic injuries and animal pests. There are general flow-chart keys corresponding to the main sections, plus more specific keys, preceding the appropriate sections, to individual insects, diseases, abiotic injuries and animal pests. Each damaging agent has relevant text and color photographs to describe and illustrate its most characteristic features.

Copies of the field guide may be obtained from the following sources:

Supplying Forest Service Silviculture personnel: Deborah Tarry, Silviculture Branch, Telephone: 387-8907.

Supplying Forest Service Protection personnel: Patricia Humphreys, Protection Branch, Telephone: 387-8737.

Supplying Registered Professional Foresters and/or contractors and forest licensees: Elaine Teske, Pacific Forestry Centre, Telephone: 388-0600.

- P. Humphreys, Protection Branch, Victoria.

FOREST ENTOMOLOGY

1990/91 Bark Beetle Program. All proposals from the regions have now been received with total requests amounting to approximately $5.5 million dollars. The estimated total allocation, for bark beetle related management activities, is $3 million. Review of proposals, and development of tentative allocations, is expected to be complete in early May. Final allocations will be made once the Ministry budget has been completed and approved. Within the available resources, activities and priorities will remain the same as in past years. One allocation will be made at the beginning of the year, rather than the two-phase process used in the past two years.

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

Bark Beetle Project Tracking System. The beetle project tracking system has been placed in the test mode of the protection systems menu. This system will be implemented, once 1990/91 bark beetle allocations have been made. The system is expected to replace the current hard-copy proposal request, and final report forms, and should greatly facilitate data entry, updating, and extraction of summaries in a timely manner. Testing of the system will be carried out this summer, in order to have it fully functional and operational by the fall, when it will be necessary to prepare a beetle program review and justification.

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

Contract Clause Standardization for Bark Beetle Activities. Many activities within the bark beetle program are conducted under contract. These activities include probing, pheromone placement, and single tree treatment. Although many response centres have developed their own contract specifications and clauses, standardization of this process is desirable. Contract formats have been collected from all districts and regions involved with the program. They will be reviewed, and standards established. A series of "boiler plate" clauses will be developed, to be utilized as the situation demands.

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

MPB SPREAD. Field data necessary to validate and calibrate the mountain pine beetle spread model have been requested from Merritt Forest District. This information will be used to fine-tune the model. When calibrated and documented, the model is intended for use at district, region, and headquarters offices, to evaluate management options, and estimate program impacts on levels of damage. This model and future models, should provide effective planning tools for management of bark beetles.

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

Okanagan Mountain Pine Beetle Task Force. The mountain pine beetle population in the Okanagan Timber Supply Area (TSA) has continued to increase over the past few years, particularly in the Penticton Forest District. Recognizing that there have been varying levels of success in managing the mountain pine beetle in the province, a task force, involving experts from many areas, has been established to develop an operations plan for the TSA. The plan will:

a) be applicable to other TSA's and forest regions with similar situations;
b) establish a level of consistency and standards for managing the mountain pine beetle in the three forest districts comprising the TSA; and
c) provide a guide for individual forest district operational plans.

This approach is intended to ensure that the mountain pine beetle management plan is the most soundly based and effective plan possible for this area. If successful, it will be applied in other areas, where a dedicated team approach, can be expected to resolve a particular issue, in a finite time span.

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

Penticton District Bark Beetle Technical Audit. An in-depth audit of the bark beetle program in the Penticton Forest District was requested by the district manager in November of 1989. An audit team, composed of a district manager, a regional timber officer, a member of the regional silviculture staff, and a Protection Branch staff member, carried out the audit in January and February of 1990. The audit team interviewed a wide variety of Ministry, industry, public, and other agencies, or groups concerned with bark beetle management activities in the district. All technical aspects of the program were examined. The overall strategy of the district was also evaluated. The audit report will be made available to the district, region, and Ministry of Forests executive in May.

The audit proved valuable to the audit team, as well as to the district. The complexities of mountain pine beetle management, especially in areas such as the Okanagan, were brought forth. The interrelated nature of programs, such as Protection, Timber, and Silviculture, were also illustrated. Management of bark beetles is a multidisciplinary challenge.

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

Prince George Forest Region Special Issue Funding. Approximately $576,000 was spent in the Prince George Forest Region in 1989-90, on mountain pine beetle and spruce beetle aerial and ground detection, pheromone baiting, monitoring, monosodium methane arsenate (MSMA) application, and single tree disposal. Thirteen projects were undertaken in five districts, including regional activities. Expenditures accounted for 96% of phase one and two allocations, and all projects were monitored for cost-effectiveness.

Approximately $842,000 has been requested from The 1990-91 Special Issue Fund for 15 projects in five districts of the region. All the money will be expended on mountain pine and spruce beetle projects similar to the above, except that aerial detection will be funded out of the regular budget. As with last year's program, all activities will be monitored and/or audited by regional staff to ensure cost-effectiveness of expenditures.

- S. Taylor, Prince George Forest Region, Prince George.

Lakes, Morice and Bulkley Forest Districts get their Hazards Rated. A 2-year contract with Phero Tech has been initiated to hazard rate pine stands for mountain pine beetle, in the eastern portion of the Prince Rupert Forest Region. One hundred thirty-seven 1:20,000 forest cover maps will be hazard rated, using the Shore-Safranyik hazard rating system. The project will be completed by July 31, 1990.

The districts will be using these maps to plan access development and harvest schedules, and to aid in resolving some major integrated resource management issues in the Bulkley and Morice Timber Supply Areas.

Please contact the undersigned if you wish to know more about the contract.

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

Cariboo Beetles Survive Winter Well. Information on winter survival of the mountain pine beetle in the Cariboo was collected in four forest districts. Data from the Chilcotin Forest District was not available and no samples were collected in the Williams Lake Forest District, which is virtually free of mountain pine beetle. From 25 bark samples selected from scattered locations throughout the 100 Mile House, Horsefly, and Quesnel Forest Districts, larval survival was 81.9%. Greatest survival (85%) occurred in the Horsefly Forest District.

The Douglas-fir beetle continues to expand in the region, especially in the Williams Lake Forest District. Twenty-five bark samples, from separate locations throughout the 100 Mile House, Williams Lake, and Quesnel Forest Districts disclosed an adult survival rate of 69.4%. This level of survival was lower than expected, considering the mild winter. However, samples were taken at breast height, where significant woodborer activity was noted. Bark collected higher on the tree bole would possibly provide a more representative sample.

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

Mountain Pine Beetle Stand Susceptibility Rating. Co-op student, Jeff Lemieux, is applying the Shore/Safranyik stand susceptibility rating method to forest areas surrounding Chilcotin Forest District's Chilko Lake outbreak. A spreadsheet program was used to calculate stand susceptibilities from forest inventory data. Susceptibility maps, with a 1:50 000 scale, have been prepared, together with a an overlay for assessing beetle pressure ratings. Once the snow has left the area, Jeff will begin field work to further refine estimates made in the office.

The second part of Jeff's assignment is to apply Dr. A.J. Thompson's mountain pine beetle spread model to the Chilko Lake population, in an effort to predict future spread and plan control efforts.

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

A Cost Comparison of Two Methods of Felling Trap Trees. In spruce beetle operations in the Prince George Forest District, faller-bunchers (235 Cat with roto-sawheads) matched the unit production costs of hand falling. Contract hand fallers cost $315/day, and faller bunchers cost $131/hour, but both techniques felled trap trees at $3/tree. The faller buncher had the additional advantage of producing bundles of trees that were more accessible and easier to pick up.

- B. Doerksen, Prince George Forest District, Prince George.

Spruce Beetle: MSMA Efficacy on Standing Attacked Trees. Since 1986, the Kamloops Forest District has been using monosodium methane arsenate (MSMA) to treat standing green spruce attacked by the spruce beetle. A study was undertaken in March, 1990, to assess the efficacy of the treatment. The results are currently being reviewed by the Kamloops Forest Region entomologist. Preliminary results from the study are encouraging.

- D. Piggin, Kamloops Forest District, Kamloops.

Spruce Bark Beetle Control Program in The Kamloops Forest District. In 1989, 224 beetle infested spruce, covering 268 ha, were treated with MSMA. The application area is protected, for wilderness and recreation purposes, and is not included in Annual Allowable Cut calculations for the Kamloops Timber Supply Area. Throughout most of the treated area, road access is severely restricted and harvesting is prohibited. Trap trees or lethal trap trees are not an option.

- D. Piggin, Kamloops Forest District, Kamloops.

Lethal Trap Tree Trial for Douglas-Fir Beetle. Control programs for Douglas-fir beetle in the Cariboo Forest Region have concentrated on harvesting infested stands, or drawing beetles into conventional trap trees felled in the shade. The felled trap trees attract beetles, and are subsequently removed to sawmills, where the beetles are destroyed during processing. However, conventional trap trees may endanger adjacent standing trees, and in areas where the fir trees are valued for other reasons, such as winter mule deer range, this is very detrimental. Treatment of inaccessible areas using trap trees is also very laborious, since the traps cannot be removed and must be burned. Lethal trap trees would provide a more flexible tool for managing the Douglas-fir beetle. They would reduce overflow into neighboring trees and eliminate the necessity of trap tree disposal.

The Williams Lake Forest District has obtained a special use pesticide permit to apply Sevin^{R} XLR on Douglas-fir beetle trap trees. The objective of this permit is to determine the efficacy of Sevin XLR, with the ultimate aim of obtaining a Minor Use Registration. Sevin XLR is currently registered for use against mountain pine beetle and spruce bark beetle.

Approximately 100 trees will be treated, in various locations, throughout the Williams Lake Forest District. On each site, five trap trees will be felled and limbed. Four trees will be treated with Sevin XLR, and one will be left untreated, as a control. The Sevin XLR will be applied to the logs in late April. The logs will also be baited with the aggregation pheromone, frontalin, to make them as attractive to the beetles as possible. Screens will be set out to catch bark beetles which die and fall off the trap tree logs. Survival of beetles, and the gallery length under the bark of the trap trees, will be measured after the flight period.

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

MCH Bead Application for Douglas-fir Beetle. The 100 Mile Forest District has applied for a special use pesticide permit to deploy the anti-aggregation pheromone MCH (3-methyl-2-cyclohexen-1-one) to repel mass attack by the Douglas-fir beetle. This trial will evaluate the effectiveness of the pheromone to inhibit beetle attack.

Approximately 50 ha of mature Douglas-fir was blown down in the Cavanagh Creek area, 20 km west of Clinton, in February 1989. The main portion of this windthrow, which comprises roughly 34 ha, will be harvested by conventional means. The remaining 16 ha is inaccessible for harvesting. This timber will provide excellent host material for Douglas-fir beetle, and could lead to a huge upsurge of the beetle population.

Close to 93 000 cubic meters of mature Douglas-fir are at risk in adjacent stands. In addition, Fish and Wildlife Branch has expressed concern for habitat destruction, since this area is high value winter and spring range for mule deer and bighorn sheep. The immediate vicinity has very poor access, and an expanding beetle population would be very difficult, if not impossible, to control. The negative effects on wildlife habitat, and timber resources, could be substantial.

The Douglas-fir beetle will begin to fly and attack susceptible timber in late April or early May. The anti-aggregation pheromone will be applied before the beetles commence their flight, during the last week of April.

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

Western Pine Beetle: The Wildland Urban Interface Within the City of Kamloops. A western pine beetle infestation in, and just outside, the City of Kamloops has been causing mortality in ponderosa pine trees (Ponderosa Pine - Bunchgrass Biogeoclimatic Zone). Control of this bark beetle is complicated by the fact that the outbreak covers a vast area of private lots and Crown land, from Monte Creek and Monte Lake, to various subdivisions in Kamloops (Barnhartvale, South Sahali, Dufferin, Aberdeen).

A number of joint inspections have been conducted with the city parks horticulture foreman so that the public can be advised of the problem. To date, 45 green attack, and 150 red attack trees have been tallied. The number of green attack trees in the subdivisions has not yet been determined. Under a nuisance bylaw, the city has issued a number of single tree disposal instruction letters to property owners.

It should be noted that Armillaria root disease was observed on many of the affected trees.

- D. Piggin, Kamloops Forest District, Kamloops.

Impacts of White Pine Weevil in the Prince George Timber Supply Area. Impacts of the spruce weevil, Pissodes strobi (Peck) (Coleoptera: Curculionidae), in the Prince George Timber Supply Area (TSA), have been estimated by analyzing survey results collected in 1989, with the computer simulation model "Spruce Weevil Attack Trial" (SWAT), developed by R. Alfaro of Forestry Canada.

Dr. Alfaro calculated merchantable and total volume reductions, at a rotation age of 100 years, for spruce stands with a site index of 23.0 m. These reductions vary with weevil incidence and duration of weevil attack.

Weevil incidence for this TSA was previously reported, in the December, 1989 issue of Pest Management Progress, as a grand mean proportion of spruce stems attacked of 3.25%, with a range of 0-26.6%. However, the duration of attack must be estimated, and is thought to be 22 years or less, with 10 and 20 years being two likely durations.

Results, using the average and upper limit of the range of incidence for this TSA, are as follows:

INCIDENCE (%)	REDUCTION IN MERCHANTABLE VOLUME AT ROTATION AGE (%)	
	Attack Duration 10 years	Attack Duration 20 years
3	2	7
27	17	39

While the current impacts appear low, there is some justification for expecting higher incidence levels, and hence higher impacts, because a large portion of spruce stands in this TSA are just becoming susceptible. When this occurs, the likelihood of spread between plantations will increase. The fact that an incidence of 26.6% was found during the 1989 surveys also indicates a high incidence potential.

The potential for significant damage resulting from P. strobi, highlights the importance of careful monitoring of incidence levels, and developing effective control strategies. The results of this work will also allow some basic management decisions to be made on weevil infested sites.

- S. Taylor, Prince George Forest Region, Prince George.

Where Oh Where Did the White Pine Weevils Go? A remeasurement of the regional research species trial, EP 712, in the Kitimat Valley, revealed that an exponential increase in Pissodes Strobi attack occurred over the last two years. 1988 and 1989 weevil attacks were monitored on 15-year-old Sitka spruce, and the location of the attacked stems was plotted on maps drawn during an earlier contract. There were three replicates, located at two sites, totalling 2,108 trees. At both sites, attack rates increased from less than 5% in 1986 to 10% in 1987, 12% in 1988, and 40 - 49% in 1989. The first site was free of competing brush and was almost free of weevils before 1987. The second site was growing under a thick canopy of alder, which resulted in suppressed leader growth and some wind whipping. Weevil attacks within the site appeared to be lower on the replicates with the heaviest overstory.

The stem maps show that attacks are only slightly clumped and are quite evenly distributed within each replicate.

The trial was funded by FRDA direct delivery funds. We hope the next remeasurement, which is planned for the winter of 1991/92, will be funded by FRDA II.

If you would like copies of the plot data, please contact the undersigned.

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

Selection and Clonal Test of Weevil Resistant/Tolerance Sitka Spruce. Over 100 putative resistant trees have been selected from our Sitka spruce provenance test plantations, and natural stands of resistant provenances. Big Qualicum, on Vancouver Island, and Allouette River, near Haney, were selection sites. Both grafts and root cuttings of these selected trees will be planted for clonal tests, in areas with heavy weevil infestations, for further screening of their weevil resistance/tolerance. There is no doubt that there are genetic differences in Pissodes strobi resistance/tolerance by Sitka spruce. We will continue to search for resistant trees, in an attempt to build up a gene pool of resistant Sitka spruce, which will eventually be incorporated into the breeding and seed orchard programs.

- C. Ying, Research Branch, Victoria.

How Bad is that Weevil at the Root Collar? This summer, University of B.C. Forest Entomology MSc. candidate, Geoff Byford, will be assessing the effects of chronic levels of Warren's root collar weevil girdling on height growth of lodgepole pine in several severely infested plantations in the Kispiox Forest District. Some of these plantations have up to 100% of their stems attacked by the weevil.

With the assistance of a local forest technology co-op student, Geoff will also track the pattern of weevil attack, by examining root collar increment cores. He will be staining these cores to determine if and when starch was deposited in the sapwood. These deposits should indicate when wounding occurred. With this data, he hopes to determine where and when the weevils first entered the plantation.

Information on early results of the study should be available in the next issue of Pest Management Progress.

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

Western Spruce Budworm Status. The area defoliated by the western spruce budworm declined overall in 1989, compared to the previous year. This trend may continue, although increases, or continuations of defoliation, may occur in some areas, such as the Okanagan. Spray operations are not contemplated by the Ministry in 1990, as those areas treated as part of the Bacillus thuringiensis var. kurstaki (Btk) evaluation and damage assessment trial are not expected to be defoliated in the coming year. Permanent sample plots will be evaluated to obtain information on mortality and increment loss caused by the recent outbreak. These measurements will continue to be taken until the recovery period after defoliation is complete.

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

Spruce Budworm Control in the Fort Nelson District. In June approximately 525 hectares of mature spruce seed production stands in the Fort Nelson Forest District will be treated with the biological insecticide, Bacillus thuringiensis Berliner var. kurstaki (Btk), to prevent severe defoliation by the spruce budworm, Choristoneura fumiferana. Branch samples, examined over the winter for egg masses by the Forest Insect and Disease Survey Unit of Forestry Canada, revealed that severe defoliation could be expected in target areas, in 1990.

Three locations, encompassing a total of five blocks, will be aerially treated using micronairs, or other ultra low-volume spray apparatus. Plot boundaries will be established in mid-May, and treatment will commence when larval development reaches the 3rd-4th instar stage, approximately June 10th. Pre-spray and post-spray branch sampling, including a defoliation assessment, will determine treatment efficacy. A smaller pilot-scale operation was first tested in 1988, with moderately successful results, against a less severe population.

- R. Hodgkinson and S. Taylor, Prince George Forest Region, Prince George.

Blackheaded Budworm Bacillus thuringiensis Berliner var kurstaki (Btk) Spray Trials - Holberg, B.C. Plans are being prepared for another trial this summer to further test the operational efficacy of Btk on the western blackheaded budworm. The results of last year's trial are somewhat inconclusive as to the effect of Btk compared to controls. The low density of budworm populations on the test sites likely contributed to this situation. This is an inherent problem when attempting to carry out control treatments on low density budworm populations.

Dr. I. Otvos of Forestry Canada will continue to be the research scientist responsible for the project.

In conjunction with this project, Dr. Otvos plans to study a pathogenic fungus which may play a major role in the population dynamics of this budworm.

- D. Heppner, Vancouver Forest Region, Burnaby.

Douglas-fir Tussock Moth. Pheromone survey traps, placed in susceptible stands by Forestry Canada and the Ministry of Forests, during 1989, caught varying numbers of female moths. However, subsequent egg mass surveys failed to find evidence of a significant population increase, and defoliation is not expected in 1990, except in very limited patches. As the tussock moth appears in a cyclic fashion in the province, a significant increase is expected within the next one or two years. Survey efforts will continue in 1990 and will involve surveys over susceptible areas, and pheromone trapping.

If defoliation is anticipated in 1991, the province has a supply of a virus specific to the tussock moth, and this will be employed at the first sign of infestation. The virus has been registered for use in controlling the tussock moth.

During 1990/91, an organization and operations plan will be developed, in the event that treatment with a virus is required. This preplanning will help to establish any program that is required, and will clearly identify the roles and responsibilities of staff in all involved agencies.

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

Gypsy Moth. As reported in the fall edition of Pest Management Progress, moths were discovered in pheromone traps placed by Agriculture Canada, the Ministry of Forests, and Forestry Canada in several locations throughout the Province. Subsequent surveys have uncovered egg masses in the Parksville area in the immediate vicinity of the area treated in 1988. Egg masses have not been found in the other locations to date. In 1990, Agriculture Canada has proposed ground and aerial applications of Bacillus thuringienses var. kurstaki (Btk) in Parksville, and intensified trapping in other areas, to precisely determine the situation.

The Ministry of Forests will continue to support Agriculture Canada's eradication efforts. This type of program has been very successful to date and is expected to continue to keep B.C. "gypsy moth free." Pheromone detection traps will again be placed around the province by the three cooperating agencies.

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

Forest Tent Caterpillar Outbreak in Prince George. An outbreak of the forest tent caterpillar, Malacosoma disstria, is expected to persist and expand around greater Prince George this spring and summer. Aerial sketchmapping by the Forest Insect and Disease Survey Unit (FIDS) of Forestry Canada in 1989 revealed approximately 103 225 ha of defoliated trembling aspen - more than double the 43 280 ha infested in 1988. Egg mass surveys by FIDS in the fall of 1989 indicated continuing high populations, with extensive moderate to severe defoliation, in the Prince George area this spring. An additional infestation of 5 065 ha near Dawson Creek is also predicted to continue at reduced levels in 1990.

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

Entomology Training for Pesticide Applicators and Silvicultural Surveyors. Entomology topics continue to be presented at forest pesticide applicator courses and silvicultural survey courses held in the Prince George Forest Region. Topics covered in the pesticide courses include basic insect biology and life histories of important pest insects, insecticide safety, and operational application technology. Presentations at the silvicultural survey courses include information about pests and associated damage symptoms typically encountered during the establishment and free-to-grow stages in plantations. Pathology training will soon be included in the latter course.

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

FOREST PATHOLOGY

Laminated Root Rot Simulator. Work is continuing on the laminated root rot model, ROTSIM, developed by W. Bloomberg, a recently retired scientist at Forestry Canada, Pacific Forestry Centre. Ken Mitchell, of Research Branch, is leading a project to incorporate ROTSIM with the Ministry model, TASS (Tree and Stand Simulator). Jeff Beale, forest pathologist in the Vancouver Forest Region, is providing survey data on root disease occurrences and infection center sizes that the model should accommodate.

Further changes to ROTSIM will be made in cooperation with Forestry Canada staff designated to participate in the project.

- J. Muir, Protection Branch, K. Mitchell, Research Branch, Victoria and J. Beale, Vancouver Forest Region, Burnaby.

Ecosystem Relationships of Coastal Laminated Root Rot. At the December Coastal Phellinus Management Cooperative (CPM) meeting, Jeff Beale discussed the results of ecosystem relationship analyses based on linear regressions of intersection-length root rot survey data. The survey data was from pure Douglas-fir stands, located in the Coastal Douglas-fir/Coastal Western Hemlock (CDF/CWHa) biogeoclimatic subzone variants, in the Port Alberni Forest District on Vancouver island. Six site units or ecosystems were identified across the CDF/CWHa edatopic grid, ranging from very dry nutrient-poor, to wet nutrient-rich ecosystems. The three parameters evaluated for variability over time in the six ecosystems were: (i) severity of Phellinus infection, (ii) infection center frequency, and (iii) infection center size.

Severity of infection was highest in the moderately dry to fresh ecosystems (20% of the area infected at 100 years), with no difference between the two ecosystems. These ecosystems are dominated by salal, oregon grape, and mosses. The strongly fresh ecosystems, dominated by foam flower, vanilla leaf and swordfern, have infection levels of 12% at 100 years. The moist rich salmonberry-dominated ecosystem was significantly different from the strongly fresh ecosystem, with severity predicted to be 5% at 100 years. Significantly different again are the very dry lichen ecosystems and the wet skunk cabbage ecosystems, with severity levels of 2% at 100 years. This data seems to corroborate data from a study of permanent sample plots, and observations from surveys around the region. The infection center frequency data was not adequately assessed using linear regressions, as evidenced by the fact that center frequency was predicted to increase with time, a fact that cannot be explained by field observations, good rationale, or models! The infection center diameter model predicted very little difference between ecosystems, with the exception of the very dry ecosystem, which has much smaller centers at 100 years. A generic infection center size model, with a Y-intercept, predicted a center size of 6.8 m at age zero (0), increasing to 15 m at 100 years. The rate of spread is about 19 cm/yr.

This work will provide us with more information on disease variability at the ecosystem level, where pre-harvest silvicultural prescriptions are made. The survey-derived initialization values will also help to varify the TASS-ROTSIM model. Contractors, Dr. Bill Bloomberg and Robert MacDonald, Dr. Ken Mitchell of Research Branch, and Jeff Beale of the Vancouver Forest Region are continuing with further non-linear analyses to fine-tune the predictions. More will be reported at the June 7-8th CPM Cooperative meeting.

- J. Beale, Vancouver Forest Region, Burnaby.

Chemical Control of Phellinus Using Chloropicrin in Stumps and Living Trees. At the December meeting of the Coastal Phellinus Management Cooperative, Dr. John Muir of the Ministry of Forests, Protection Branch, outlined the research of Dr. Walt Thies of the U.S. Forest Service, on the use of chloropicrin to treat stumps and living trees infected with Phellinus weirii. Virtually complete mortality of P. weirii in stumps and living trees has been obtained at least 2.5 m out along the roots. The treated trees were observed by a number of Cooperative members last fall in Oregon. Virtually all live trees showed a tremendous response seven years after treatment. Walt is actively involved in large scale chloropicrin efficacy and environmental fate studies, for the U.S. federal government. Briefly, the treatment method involves mechanical boring of the tree or stump (the number of holes is diameter dependent), and applying a metered dosage of chloropicrin from tanks mounted on a motorized tractor. The treatment holes are then plugged with corks. The treatment is deemed safe by local Oregon labour authorities. The fungicide was recently registered in the USA as a stump treatment for laminated root rot. No operator difficulties are reported but the treatment is labour intensive. Some distinct advantages of this method are: (a) live trees respond well, which is good for control in park situations and thinning applications; and (b) the treatment is suitable for steep slope or soil sensitive sites and small isolated centers. A disadvantage of this method will certainly be obtaining public acceptance for it, but much of this may be facilitated by Dr. Thies' present studies and any other studies conducted in B.C. to evaluate possible chemical movement into soils from treated stumps. The cost of this treatment was estimated to be nearly equivalent to our present $1,000/ha destumping costs, but more time-motion studies are required. Furthermore, tests need to be conducted in B.C., where conditions are slightly different. Data obtained from such trials would be helpful for Agriculture Canada's review of the chemical for registration.

The Vancouver Forest Region is coordinating a test of this control method with Walt Thies (U.S. Forest Service), Gerry Fraser (Canadian Pacific Forest Products), Janni Kumi (MacMillan Bloedel), and the Port Alberni and Duncan Forest Districts. The tests will be made this summer or fall, 1990, upon approval by the Pesticide Control Branch of a research permit application.

- J. Beale, Vancouver Forest Region, Burnaby.

Phellinus Control: A 10-Year Review of Destumping Trials in the Vancouver Forest Region. Melodie Neumann, a Simon Fraser University Co-op student working with Jeff Beale, presented a review of destumping projects conducted in the Vancouver Forest Region during the past 10 years. The review focused on the costs per hectare of the projects and factors that significantly affected the costs. Cost prediction functions indicate that costs increase with Douglas-fir stump diameter and percent slope. Operator experience and prescribed burning before treatment also appear to reduce destumping costs, even though statistical differences could not be detected at high levels of confidence. The unfortunate side to conducting such analyses is the "noise" in the data due to non-standardized cost accounting procedures and the confidence of stand and site data pertaining exactly to the treated areas in larger blocks. A comparison of survival between destumped and adjacent control areas was attempted but most areas were not old enough to provide a good estimate of Phellinus activity. Furthermore, there were few properly laid out control areas in which to make comparisons, a problem that should be addressed in future destumping operations. If the few untreated control areas were representative of the destumped areas, then the estimate of survival in control versus destumped is about 99.5% versus 95%, 10 years after treatment and planting. Copies of Melodies' report are available from Jeff Beale, Vancouver Forest Region.

In order to rectify some of the discrepancies in future destumping trials the regional pathologist, Vancouver Forest Region, will be designing a database program for documentation of project summary data requirements. The program will be for DOS driven IBM compatible computers and may also be available on the Ministry of Forests, Protection VAX computer system. The intent is not to produce a lot of extra work, as most data requirements can be met by the pre-harvest silviculture prescription document and contracted documents for destumping work. If the Coastal Phellinus Management Cooperative would "buy in" to this it would facilitate a much better understanding of cost parameters, future tracking of destumping efficacy studies, and perhaps even an understanding of the biological behaviour of Phellinus weirii.

I would like to acknowledge the good work of Carla Elm, a Simon Fraser University Co-op student who collated most of the data used in this study and conducted the first approximation of costs and factors; and Melodie Neumann who completed the 10-year review. Furthermore, I appreciate the great cooperation we had from many foresters and technologists who helped supply the data from company and forest district offices. Thank you.

- J. Beale, Vancouver Forest Region, Burnaby.

Armillaria ostoyae: A Problem in the Cariboo Region? Let's Find Out! Armillaria root disease has the potential to become one of the most important and chronic pest management problems in the Cariboo Forest Region. Little research has been done thus far to estimate its abundance or impact on Cariboo forests.

The Cariboo Forest Region will conduct a study to determine the incidence of and the volume loss due to Armillaria ostoyae in the Williams Lake Timber Supply Area (TSA). The most recent root disease sampling method, the pixel survey, will be used. The pixel survey is similar to a strip survey, but the transect lines are segmented into 10 m x 3 m plots. Each plot is surveyed until Armillaria root disease is detected. Once detected, the complete pixel is surveyed. All the trees in the pixel plot must be examined if the pixel is to be marked uninfected. The percentage of infection (by area) is then calculated.

The survey will be done in age class 5+ stands of predominately Douglas-fir and lodgepole pine. The study areas were chosen at random and are situated in all biogoeclimatic zones in the Moffat Supply Block. Areas have been stratified by canopy cover using color aerial photos. A percentage of each strata will be surveyed.

An estimate of volume loss can be obtained by combining the percentage infection with the mensurational data collected on each tenth pixel.

This survey will provide information for a preliminary study to quantify Armillaria root disease in a particular portion of the Williams Lake TSA, primarily in the transition zone. Results will provide the base data required for additional research, as well as an indication of the extent of the problem.

- H. Dickinson, Simon Fraser University Co-op Student,
  Cariboo Forest Region, Smithers.

Cariboo Root Rot Disease Survey, JM 064 FRDA Pest Control Phase II. Root rots affect the productivity of an unknown portion of lodgepole pine stands in the Williams Lake Forest District. To document the magnitude of the problem an inventory survey method must be developed.

Phase I of the Forest Resource Development Agreement (FRDA) JM064 root disease project, included review of aerial photographs supplied by the Ministry of Forests to determine how to identify forest stands with root disease. A pattern for field surveys was designed, and a report on photo interpretation procedures submitted to the Ministry in March, 1989.

A Summary of the Phase II Project is presented as follows:

Objectives:

a) to ground check areas suspected of having root disease to test aerial photograph interpretations in the Redeau Lake area;

b) to conduct a trial root disease survey in the MacIntosh Lake area; and

c) to report methods, results, and recommendations for large-scale inventory surveys.

Procedures

A) Redeau Lake

In Phase I, areas suspected of having root rot were identified on 1:10 000 aerial photos. In Phase II, areas known or suspected to have root rot from ground observation were superimposed over the photos. In most cases, the latter areas were larger than the former. Sample lines were designed to transect locations from both sources and some areas were deemed uninfected by either prediction method.

B) MacIntosh Lake Area

The contractor was supplied with 1:15 000 colour aerial photos in the vicinity of MacIntosh Lakes which the Ministry of Forests knew to contain root rot centres. The contractor had no knowledge of the locations, and had made no observations to reinforce photo interpretation. Again, areas of suspected root rot, and areas where other factors were suspected of causing openings, were marked on photos, and a sampling pattern designed.

Observations

Sampling along the pre-determined survey lines confirmed the presence of root rot, specifically Armillaria spp., in both test areas. In addition, evidence of root collar weevil, Hylobius warreni, was found in both test areas.

A) Redeau Lake Area

All predicted areas of infection on the photos were confirmed by the ground surveys. However, the extent of root rot incidence is far greater than either photo interpretation or original ground observations predicted. The pre-determined survey lines did not establish the outer limits of the infestation in any direction.

B) MacIntosh Lake Area

The field survey confirmed some of the locations suspected to have root rot.

A significant area of severe root rot damage was found on an old clearcut with 2 meter high deciduous and coniferous regeneration. The contractor did not notice this in Phase I and could not distinguish it later on the photos, despite knowledge of its existence.

Evidence of root rot was also found along the survey lines in areas not identified in the Phase I photo interpretation.

Conclusion

A) Photo Interpretation

The field survey information confirms that root rot centres can be identified from aerial photography of a 1:10 000 or 1:15 000 scale, but the contractor was not able to identify all of the infection centres or the full extent of them.

The study indicates that a 1:10 000 scale gives a more reliable prediction than a 1:15 000 scale. All photo interpreted areas in the Redeau Lake area (1:10 000 photography) had root rot. Some of the suspicious areas in the MacIntosh Lake area (1:15 000 photography) were not root rot, or could not be confirmed to be caused by root rot.

B) Field Sampling Procedure

Field sampling procedures should be designed to meet the objectives of the survey - i.e. to establish the existence of infestation, or to establish the perimeter of damage.

- D. Doidge, Cariboo Forest Region, Smithers.

Detection of Root Disease via Satellite. Nelson Forest Region obtained winter satellite images in February 1989, during a very cold, clear weather period. Given that root disease opens forest canopies, snow should show in possibly infected open places on the images, either affecting the color of the stands, or causing them to have a white speckled appearance. The winter images were blown up to a 1:50 000 scale and used, in conjunction with 1:50 000 forest cover maps, to determine suspect areas for ground sampling.

Douglas-fir growth types that were "speckled" were found to have Armillaria 70% of the time. Stands of mixed deciduous and conifer trees were infected 90% of the time.

Winter and summer satellite images, enhanced to emphasize the green brush or white snowy patches in openings, show much promise for widescale identification of root disease.

- D. Norris, Nelson Forest Region, Nelson.

Root Disease Big Time, Small Business Forest Enterprise Program Surveys and Treatments. All the root disease surveys conducted by the Kamloops Forest District under the Small Business Forest Enterprise Program (SBFEP) were done by contractors and administered by Forest Health. Seven timber sales received a full probe survey, using 50 meter strip intervals, and a reconnaissance was done of another 16 sales. The root disease incidence on these 16 sales was so high that a full survey was not required. We ran out of money long before we ran out of areas to survey. The high incidence of root disease on SBFEP timber sales has caught all district staff, except those in Protection, by surprise.

Armillaria and Phellinus were the root diseases most commonly found. Armillaria was also observed in deciduous trees. Tomentosus root disease and rust red stringy rot were also observed.

In 1989, the Silviculture program stumped a 36 ha lodgepole pine stand infected with Armillaria root disease. Several different excavators were used to compare machine productivity. For information, contact the Kamloops Forest Region office.

- D. Piggin, Kamloops Forest District, Kamloops.

Prince Rupert Forest Region Produces Guidelines for Cultivating Rhizina Root Disease. Over the past few months, a committee, formed by regional Silviculture staff and chaired by our own Bill Young, has struggled to establish usable management guidelines for dealing with Rhizina root disease. With the assistance of such diverse sources as Don Norris (Nelson Forest Region), Brenda Callan (Forestry Canada, Victoria), and Colene Wood (Silviculture Branch, Victoria), the committee has produced recommendations suitable for implementation at the district level by Forest Service personnel, contractors and licencees.

Briefly, the guidelines stress the importance of early detection via surveys, as well as methods for conducting surveys, and strategies for dealing with the pathogen after detection. Information collected from surveys, to be conducted this year in the Kalum and Kispiox Forest Districts, will be analyzed for factors which may predispose sites towards Rhizina and will help produce a hazard rating system for these stands. More information on the guidelines can be obtained from the undersigned.

- S. Zeglen, Prince Rupert Forest Region, Prince Rupert.

Inonotus tomentosus killing spruce in plantations in the Prince George Forest District. A recent survey of 12 spruce plantations, established between 17 and 25 years ago, revealed a low incidence of mortality and symptomatic trees in all but one plantation. Infected trees consistently showed typical above ground root rot symptoms - i.e. recently reduced height increment, thinning crown, thinning and yellowing foliage, stress cone crops, mortality and live windthrow. Exposed broken roots of windthrown trees exhibited reddish brown stain and white pocket rot. Tomentosus fruiting bodies were found growing out of the root collars of both dead and live infected trees.

Over 95 ha in two plantations were intensively surveyed using 5 m wide transects. The locations of 37 dead and 125 symptomatic trees, within the transects, were mapped to enable simple follow-up surveys to determine the rate of spread, with minimal effort. The incidence at the Vama Creek plantation (age 20) was 1.4% and at the Buckhorn Lake plantation (age 25) was 3.2%. Although the incidence was low, there is reason for concern, since the distribution of diseased trees was very scattered, and the extent of the problem appears to be very widespread.

A 14.9 m radius growth-and-yield plot was established in each of the above mentioned plantations, with the assistance of silviculture and inventory regional staff. Incidence of Inonotus was 9% and 18% at the Vama and Buckhorn plantations respectively. These plots were installed using Inventory standards and will provide valuable information on growth and yield losses, rates of spread, etc. More plots will be established this fall.

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

When in Doubt, Put In A Trial. Last spring, high on a block overlooking beautiful Shuswap Lake, the Forest Resource Development Agreement (FRDA) sponsored a silviculture site preparation workshop/demonstration. Many a silviculturist trod over the clearcut, productive ICHmw3 site, examining the best equipment for the job. When everyone went home the Salmon Arm Forest District was faced with reforesting this area, which contains the hidden competitor, root disease. The only treatment that would have done the best site preparation, destumping, was not demonstrated or recommended at the workshop. However, given the site conditions, this would have been a prudent decision.

Instead, a species trial will be established this spring, on ten hectares, that will include interior spruce, paper birch, Douglas-fir, lodgepole pine, ponderosa pine, and western white pine. Survival and productivity will be monitored.

- H. Merler, Kamloops Forest Region, Kamloops.

Push-Over Logging. Push-over logging is a harvesting method that is useful for root disease and dwarf mistletoe control. Dick Bova Logging in Cranbrook has developed a push over logging technique that is being tested, on private property, to create fields. After logging, the field is established, with minimal or no work required, prior to grass seeding. As this logging technique does not cause compaction, and the debris piles formed contain a good mix of fuel sizes, a complete burn and good smoke management is ensured, and full use of the land is possible after burning. The skidder operator noted that skidder roll-overs, which often occur two to three times per year, due to stumps, did not happen during push-over logging. As well, tire wear and damage was negligible after 500+ hours of operation.

No cruise-to-cut comparisons were possible, but the logging company reported yields consistently higher than would be expected from similar, adjacent timber types. In very marginal timber types, expected to yield 90 m^3/ha, they were removing between 120 - 150 m^3/ha, mainly due to the many small, marginally merchantable trees (i.e. 10 - 15 cm DBH) that were taken to the landing. Stump volumes and little breakage also added to the volume being harvested.

- D. Norris, Nelson Forest Region, Nelson.

Rhizina Root Disease Survey. Frank Rowe, a temporary employee at Protection Branch, compiled the 1989 results of Ministry surveys for Rhizina root disease in the Nelson Forest Region. The fungus, Rhizina undulata, infects and kills newly planted seedlings only on burned-over sites, but does not appear to persist for more than two or three years.

The summary, requested by the Silviculture-Protection Action Committee, a joint committee of Silviculture and Protection Branches, indicated that a substantial newly planted area was damaged, and that some areas will have to be replanted in 1990. Trends in damage were noted, and appeared to be correlated with the intensity of the prescribed burn, and the ecological subzone. Data summaries and graphics are being assembled as an internal report (please see graphs on page 45 of this issue).

Further assessments are planned for the Prince Rupert Forest Region and other areas in 1990.

- J. Muir, Protection Branch, Victoria.

Lodgepole Pine Dwarf Mistletoe Survey Data Analyses. Recent analyses of lodgepole pine dwarf mistletoe roadside survey data in the Prince George Forest Region have been made by Dr. A. Thomson of Pacific Forestry Centre to estimate the effect of the mistletoe infection on timber volume.

The analyses indicate a reduction in volume growth of trees with differing intensities of dwarf mistletoe infection and stand density. Previous surveys had not accounted for the local pronounced effects of density on the growth of lodgepole pine. A comparison of the percentage of trees infected and the dwarf mistletoe rating for infection intensity is being done.

If the comparison shows a good correlation, then the amount of stand infection can be determined by roadside observation of proportion of trees infected, and the reduction factors can be applied to the current inventory volumes per stand to estimate the mistletoe impact. The other option is to extrapolate from 300 temporary plots or do more detailed analyses of the roadside data.

- J. Muir, Protection Branch, Victoria, and R. Reich, Prince George Forest Region, Prince George.

Termination of Lodgepole Pine Dwarf Mistletoe Trial in the Mackenzie Forest District. Our number two mistletoe spacing trial will soon be bulldozed to make way for a tire store (read PMP Vol. 2, November 1986, pages 30-31 for details of establishment). Permanent operational trials take considerable time and effort to establish and maintain. Before pounding in a center stake, it wouldn't hurt to consider the wisdom of it's location. Permanent plots, if important, should not be located close to highways, roads or areas which are prone to being developed, logged, or becoming sources of gravel, etc.

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

Recovery of Douglas-fir plantations from dieback in the Prince George Forest Region. A 1986 survey of 16 young Douglas-fir plantations and natural stands in four districts indicated that over 80% of the stands were affected by leader and branch dieback (PMP Vol. 2, page 32). The incidence ranged from 1% to 70% and the average incidence was approximately 30%. A follow-up survey of the plantations demonstrated that recovery was close to 100%, in almost all plantations, by the fall of 1989.

Recovery apparently occurred for two reasons. One, there was an absence of the climatic conditions that originally initiated the widespread dieback. Two, most plantations were located on slopes greater than 10%, which allow cold air drainage on nights with strong radiative cooling. The only plantation that did not recover was located at the toe of a slope and a bench, bordering a mature stand. Here the incidence of non-crop trees affected by dieback was over 50%, with no signs of recovery.

Apparently, advective frosts, occurring on a periodic basis, can cause widespread frost damage and dieback (the frost killed tissues almost always being colonized by a Sclerophoma spp.) that is not restricted to local topography. Douglas-fir saplings usually recover from these periodic events if they are not subjected to repeated frost stress, as often occurs in severe frost pockets, or do not become attacked and severely deformed by more aggressive canker fungi such as Cytospora kunzie.

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

Scleroderris Canker National Policy. After several years of discussion, and a 1988 workshop in Ottawa, where provincial and federal representatives gave their positions, a draft national policy on Scleroderris canker has been prepared and circulated for comment.

British Columbia is free of the disease-causing fungus, particularly the virulent European strain that has caused severe infestations in eastern Canada and the U.S.A. Four locations in B.C., previously reported to have Scleroderis canker, have been checked, and the disease has not been found again.

The major concern is to prevent the introduction and spread of the disease in susceptible-tree plantations and young stands. In eastern Canada, infected nursery seedlings appear to have been the major means of spread. A procedure for inspecting and monitoring seedlings for pests is in place in B.C., and personnel have been alerted to watch for possible occurrence of the disease.

- J. Muir, Protection Branch, Victoria.

Pinewood Nematode Situation. Recent shipments of eastern Canadian lumber to Finland were discovered to contain pinewood nematode. Finnish regulations now require that all imported North American forest products be kiln-dried or have a phytosanitary certificate stating that the products do not contain the nematode.

As a result of this development, the European Economic Community (EEC) will require that all lumber from Canada be kiln-dried. Discussions by industry and federal government staff at a recent meeting in Brussels have resulted in the postponment of the requirement until 1990. However, the new requirement is expected to have a major financial effect on forest product exports from British Columbia coastal mills, particularly to the United Kingdom.

Forest industry and the federal government are monitoring the situation closely, and are hopeful that the EEC countries may eventually be persuaded to accept the B.C. bark-free certificate instead of requiring kiln-drying or a less reliable phytosanitary certificate.

- J. Muir, Protection Branch, Victoria.

VERTEBRATE PEST MANAGEMENT

Porcupines Run for Cover as Porkies VI Hits Khutzeymateen. During the second week in May, regional staff from Protection, Research and Silviculture will be joining North Coast Forest District porcupine tracker extraordinaire, Bill Jackson, in the annual trek to the Khutz Inlet. Participants will monitor permanent sample lines to assess new damage resulting from this winter's feeding activities. Data will also be collected on a project involving the use of metal collars placed around the base of trees in the hopes of thwarting the advances of the ravenous herbivores (barkivores?). Sorry, Folks, tickets for this year's tour are already sold out.

-S. Zeglen, Prince Rupert Forest Region, Prince Rupert.

Porcupine Control with Fishers. The potential to control the rampaging populations of porcupines with fisher predators is growing ever stronger. During April of this year we identified that healthy populations of fishers exist in the Northwest Territories, Ontario and Saskatchewan. Letters have been sent to the directors of those wildlife branches requesting permission to live-trap fishers for British Columbia. As well, permission is being sought from B.C. Wildlife Branch to import and release the animals. Prospects for fisher introductions look good so far. The Wildlife Branch, under the direction of Williams Lake Wildlife Biologist, Dr. Daryl Hebert, is currently initiating a fisher study to learn more about fisher biology and population dynamics. Many of the aspects of the Wildlife Branch study will assist us and we should also receive some fishers for the north coast from the study.

In the most recent porcupine survey in the Khutzeymateen Inlet area during May, fisher predation from previously released fishers is suspected. Three of the four permanent transect lines show low damage and fishers have been recently sited in the area. Even more significant is a report that a fisher in the Kalum valley has been recently identified as killing five porcupines. These porcupines were part of a population of radio-collared animals being studied by graduate students of Dr. Tom Sullivan.

As a final note on porcupines, the Cranbrook Forest District is initiating a plan to conduct a damage survey for porcupines. It appears that porcupines in that area have been creating enough damage to be noticed as a problem. We have no idea about the status of fisher in that District.

- J. Henigman, Protection Branch, Victoria

RANGE PEST MANAGEMENT

New B.C. Forest Service Weed Man. Allan Sturko, who hails from Brandon, Manitoba, is the Forest Service's new provincial weed coordinator.

Based in Kamloops, Allan will help orchestrate the biological, as well as the chemical weed control effort on Crown Lands. This is a welcome addition for region and district Forest Service staff, who recognize the importance of weed control, but have little extra time to devote to planning and coordinating the effort.

Allan obtained his BSA and MSc. at the University of Manitoba. After working a stint as regional soils and crops specialist in Saskatchewan, he went on to become provincial weed specialist for the Province of Manitoba.

Sturko is new to the British Columbia interior, but is no stranger to biocontrol. He was active in a leafy spruce control project (using Aphthona) in Manitoba.

Along with his duties as chief bugmaster, Allan will be coordinating the chemical containment programs for knapweeds and other species.

Welcome aboard, Allan!

- P. Youwe, Kamloops Forest Region, Kamloops.

Agroforestry - Sheep Grazing as a Method to Reduce Competing Vegetation on Conifer Plantations. The agroforestry method of controlling forest weeds, through the use of sheep grazing, shows promise as a viable cost-effective method of promoting the best plantation growth possible. All trials using this methodology, conducted in British Columbia and the Pacific Northwest to date, have conclusively demonstrated conifer growth parameter increases, especially basal diameter.

Five years of sheep grazing trails in the Clearwater Forest District have produced the following general observations, although some of them have not been tested for statistical validity:

1. Conifer species are susceptible to terminal nipping in the following descending order: flushing pine, flushing Douglas-fir, flushing spruce, hardened pine, hardened Douglas-fir, hardened spruce. It would be accurate to say that any flushing species is less resistant than the same hardened species, but hyphothetical to say, for instance, that hardened Douglas-fir is less resistant than flushing spruce.

2. The palatability of each competing vegetative species, and the biodiversity of these species, are major factors in the timing of conifer terminal nipping damage.

Agroforestry - Sheep Grazing as a Method to Reduce Competing Vegetation on Conifer Plantations (con't).

3. Terminal nipping occurs largely within a descending palatability order, and as sheep are creatures of "preference habit," it thus becomes unacceptable at a point in time. In flushing spruce plantations, 80% of the biomass can be grazed with little conifer terminal damage, and 99% biomass removal has been observed on hardened spruce plantations. Younger Douglas-fir plantations should only be grazed in the flush when much preferred diverse competitive vegetation is available.

4. Mechanical damage increases with grazing duration and can be minimized by grazing a large number of sheep in relation to cutblock size to reduce grazing time.

5. Multiple yearly grazing treatments, with an ideal turnaround time of 30-40 days, would be ideal to achieve maximum weight gain for the grazers and maximum damage to the competing vegetation.

6. The use of low-growing domestic legume-grass mixtures can reduce the taller, less palatable, native vegetation, so that greater biomass can be removed before conifer terminal nipping occurs. These grasses will take over the site because of their greater resistance to grazing. It is not known yet what the plantation response would be to these less light-restricting species.

7. In terms of cost-benefit, only plantations where immediate survival, or long term growth, is directly compromised by herbaceous and brush invasion, would be targeted for sheep grazing control. When a number of these problem cutblocks are within a sheep "run" this becomes a logistical cost-benefit area. An "agroforestry design" would therefore concentrate on economics, high cost-benefit, regrazing dynamics, and timing, possibly including elevational timing.

More agroforestry sheep grazing trials will be conducted in 1990 in the Clearwater Forest District.

- G. Ellen, Clearwater Forest District, Clearwater

PESTICIDES

New Edition of the Forest Supplement to the Handbook for Pesticide Applicators and Dispensers. The Forest Supplement publication, used as a forest pesticide applicator certification course manual, is being updated. The new edition should be available later this summer. The general format of the publication will remain unchanged but the sections will be updated with new information. The publication will also assist those students who wish to study for their pesticide certification in a home study situation. Copies of the Supplement can be purchased from the Pesticide Control Branch regional offices.

- J. Henigman, Protection Branch, Victoria.

New Pesticide Registrations. In the past months there have been a number of new forest pesticide registrations. The following are new herbicide registrations:

- Ezject^{R} Capsule Injection System, PCP #21262, active ingredient: glyphosate, marketed by Monsanto Co.;
- Pronone^{R} 5G, PCP #21389, and Pronone^{R} 10G, PCP #21390, active ingredient: hexazinone, marketed in B.C. by United Agri Products; and
- See^{R} 2,4-D, PCP #20859, active ingredient: 2,4-D, 2,4-D iso-octyl ester, marketed in B.C. by United Agri Products.

A new Btk insecticide product now registered is:

- Futura^{R} XLV-HP, PCP #213484, active ingredient: Bacillus thuringiensis var kurstaki, marketed by Chemagro Limited.

Labels and material safety data sheets are available for these new products from Protection Branch.

- J. Henigman, Protection Branch, Victoria.

Proposed Changes to the Processing of Pesticide Permit Applications. As many of you may know, the Pesticide Control Branch wishes to make the following modifications to the procedures for handling permit applications.

- Applicants would advertise their applications as soon as they were applied for.
- Public comments would form part of the evaluation of the permit applications.
- Permits would be issued by regional managers of the Pesticide Control Branch, and there would be regional Pesticide Control Committees to assist the managers.
- Appeals would be heard first by the Branch Director, and only upon a lack of resolution would the Appeal Board hear an appeal.

Since the Pesticide Control Act will have to be amended these changes should not be expected to occur quickly, though we may see some of these changes by the fall of this year. All of the changes should be constructive to the administration of forestry pesticide use permits.

- J. Henigman, Protection Branch, Victoria.

Environmental Appeal Board Changes. Since the beginning of the year, Mr. Paul Jarman has been named the new interim chairman of the Appeal Board. Mr. Jarman is a senior solicitor with the Attorney General and will likely remain the Appeal Board chairman for three to four months. His primary duty during this time will be to review the performance of the Board and make recommendations to the Ministry of Environment executive on modifications to Board procedures.

During this time we do not expect significant changes in the procedures used by the Board. Mr. Jarman's recommendations are not likely to become visible until later this year. We expect, however, that the Board may ultimately become much more sympathetic to emotional concerns expressed by appellants than it has to date.

- J. Henigman, Protection Branch, Victoria.

Pesticides to be Tested for Control of Douglas-fir Beetle. Due to the recent outbreak of Douglas-fir beetle, a number of alternative pesticides will be tested for their efficacy in controlling the pest. Since Douglas-fir beetle has rarely posed a significant problem in past years, no pesticides have been registered for its control. In both the Cariboo and Prince George Forest Regions, AWK mineral oil will be tested as a stump spray. This oil is a very old herbicide product, used in agriculture for post-emergent weed control. It appears to be able to kill beetles and larvae in logs. An anti-aggregation pheromone product called MCH^{R} Bead will be broadcast sprayed, by aircraft, in the Cariboo Forest Region in a trial to assess efficacy. This trial will be our first use of pheromones as a pesticide. Previously pheromone products have been used only as monitoring or lure devices. Carbaryl (Sevin^{R}) likely will also be tested in the Cariboo Forest Region. It is currently registered for control of spruce and mountain pine beetles.

- J. Henigman, Protection Branch, Victoria.

Nursery Pest Management Trials. Several pest management trials are planned for the 1990 growing season. Most projects will be conducted with the cooperation of nursery personnel throughout the Province.

Liverworts continue to be the most significant weed problem in outdoor container compounds. There are some indications that the copper formulation used in Beaverfoam^{R} trimplugs reduces the spread of liverworts when painted on the surface of styroblocks. With the cooperation of Beaver Plastics Ltd., we are treating 21 blocks at five different nurseries and will subjectively assess the control achieved when the stock is lifted. The herbicides chloroxuron, simazine, lactofen, and a growth regulator, will also be tested for liverwort control.

The synthetic pyrethroid, Cymbush^{R}, has recently been registered for control of Lygus bugs in conifer seedling nurseries, and this summer trials will be initiated to extend this use to the Ambush^{R} label.

Keithia foliar blight of Western red cedar continues to be a problem at several coastal nurseries. The fungicide, Bayleton^{R}, has proved to be effective against this disease in American nurseries. Bayleton has also provided good control of Sirococcus shoot blight. This product will be tested against both diseases at several B.C. nurseries.

A project to gain the necessary information to develop a nursery certification program for the balsam woolly adelgid will be initiated. This will be in cooperation with Allan Van Sickle, Lee Humble, and the Forest Insect and Disease Survey (FIDS) staff at Pacific Forestry Centre. Lee is conducting trials to develop a passive trapping technique for the mobile crawler stage. Studies will be conducted in an infested area and will attempt to determine the length of the dispersal period, as well as threshold levels for detection. The FIDS rangers will conduct a risk assessment survey of existing balsam woolly adelgid populations near three nurseries within the quarantine zone.

Work to develop sterilizing agents for control of seed born Fusarium will continue. Standing and running water, as well as hydrogren peroxide and bleach, will be tested.

- G. Shrimpton, Silviculture Branch, Surrey.

An Environmental Monitoring Project for the Herbicide Picloram. This spring the Ministry of Forests, as part of its role in the Pesticide Control Committee, is undertaking an environmental monitoring study of the herbicide picloram in the Boundary Forest District. A product called Tordon^{R} 22K, marketed by Dow Elanco Canada Inc., will be used. This herbicide has been used for many years to control various noxious weeds, including knapweed, in the southern interior of the province. Very little environmental monitoring of the chemical has occurred in the province. There have been problems with the use of some formulations of the herbicide in other parts of Canada and the U.S. Other than some isolated improper uses of picloram in British Columbia, we have not identified any significant local problems with the use of picloram for noxious weed control.

An assessment of the persistence and the over-soil mobility of the herbicide in the Boundary Forest District is proposed. The project will take a few years to complete and should allow us to prescribe picloram use with more confidence. Environmental use guidelines may also be developed from the results of this study.

- J. Henigman, Protection Branch, Victoria.

Acephate and Oxydemeton-methyl Stem Implants for White Pine Weevil Control. In 1989, a small trial to test insecticide implants for weevil control was conducted by Gerry Fraser of Canadian Pacific Forest Products Ltd., Qualicum Beach. Ace Cap-97^{R} capsules containing acephate, and Gel-Cap capsules containing jelled oxydemeton-methyl were injected into 20 trees located in three plantations during the last two days of March, 1989. The trial was funded by the South Moresby Forest Replacement Fund.

Both acephate and oxydemeton-methyl worked well in protecting trees from weevil damage during the first year (the trees will be reassessed this summer). The overall average attack in the untreated control trees was 60% compared with 8.3% in the Ace-Cap treated trees and 6.7% in the oxydemeton-methyl-treated trees. Of the nine treated trees that were attacked eight were larger than the mean diameter (DBH) for all the trees. This suggests that the larger trees may not have received an adequate dose.

Although these treatments seem to work, they are, unfortunately, much too labour intensive to be operational for forestry purposes. Even though this project did not receive continued funding from the South Moresby Fund, C.P. Forest Products is currently testing the use of Monsanto's Ezject lance to reduce the amount of labour involved. Final results will be reported in the next edition of Pest Management Progress.

- D. Heppner, Vancouver Forest Region, Burnaby.

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

Protection Branch			
R. F. (Bob) DeBoo	Manager, Forest Health	Victoria	387-8740
P. M. (Peter) Hall	Forest Entomologist	Victoria	387-8742
J. F. (John) Henigman	Pesticide Specialist/ Vertebrate Pest Specialist	Victoria	387-8738
J. A. (John) Muir	Forest Pathologist	Victoria	387-8739
Vacant	Pest Management Forester	Victoria	387-
P. J. (Pat) Humphreys	Pest Management Technician	Victoria	387-8737
Silviculture Branch			
M (Mike) Wyeth	Silviculturalist	Victoria	387-8922
J. (Jacob) Boateng	Brushing and Weeding Specialist	Victoria	387-8905
N. (Nancy) Densmore	Stand Tending Operations Forester	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	576-9161
D. (Dave) Trotter	Nursery Pest Control Officer	Surrey	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	Forest Pathologist	Williams Lk.	398-4442
J. (Jane) Perry	Stand Tending Forester	Williams Lk.	398-4400
C. (Chris) Easthope	Range Agrologist	Williams Lk.	398-4396
(Vacant)	Resource Officer Protection	Horsefly	620-3417
District Staff			
R. (Richard) McKay	Resource Officer Protection	Chilcotin	394-4315
J. (John) Hoyrup	Resource Officer Protection	Horsefly	620-3417
D. (Dennis) Asher	Resource Officer Protection	Quesnel	992-4400
W. (Wayne) Hendry	Resource Officer Protection	Williams Lk.	398-4341
V. (Von) Vickers	Fire/pest Management Officer	Williams Lk.	398-4690
M. (Mel) Dodge	Resource Officer Protection	100 Mi. House	398-3812
D. (Don) Wright	Pest Management Officer	100 Mi. 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	Range Agrologist	Kamloops	828-4582

District Staff

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

Nelson Forest Region

Region Staff

Vacant	Pest Management Forester	Nelson	
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	Golden	344-7500
S. (Emile) Begin	Pest Management Officer	Invermere	342-4200
J. (Jim) Schafthuizen	Pest Management Officer	Kootenay Lake	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
R. W. (Richard) Reich	Forest Pathologist	Pr. George	565-6143
S. P. (Stuart) Taylor	Pest Management Forester	Pr. George	565-6123
R. F. (Rob) Bowden	Stand Tending Forester	Pr. George	565-6191
K. (Ken) Long	Range Officer	Pr. George	565-6138

Prince George Forest Region (con't)

District Staff

P. (Paul) Gevatkoff	Resource Officer - Protection	Dawson Creek	784-2350
R. (Rick) Grayston	Resource Assistant - Protection	Dawson Creek	784-2350
B. (Bruce) Young	Resource Officer - Protection	Fort Nelson	774-3936
A. (Atvin) Boyer	Resource Officer - Protection	Fort Nelson	774-3936
L. (Lance) Mitchell	Resource Officer - Protection	Ft. St. James	996-7131
P. (Terry) Corley	Resource Assistant - Protection	Ft. St. James	996-7131
A. R. (Al) Kneeland	Resource Officer - Protection	Mackenzie	997-3310
Vacant	Resource Officer - Protection	Ft. St. John	787-3483
Vacant	Resource Officer - Protection	Robson Valley	569-2265
A. D. (Dale) Cinnamon	Resource Officer - Protection	Robson Valley	569-2265
F. L. (Fred) Turner	Resource Officer - Protection	Pr. George	565-7100
B. L. (Bruce) Doerksen	Resource Assistant - Protection	Pr. George	565-7100
M. F. (Mike) Dittaro	Resource Officer - Protection	Vanderhoof	567-6363
M. B. (Mike) Pritchard	Resource Assistant - Protection	Vanderhoof	567-6363

Prince Rupert Forest Region

Region Staff

S. (Steve) Schmidt	Protection Officer	Smithers	847-7475
T. (Tim) Ebata	Forest Entomologist	Smithers	847-7479
S. (Stephan) Zeglan	Forest Pathologist	Smithers	847-7478
B. (Bill) Young	Pest Management Forester	Smithers	847-7477
L. (Lou) Tromp	Stand Tending Forester	Smithers	847-7514
D. (Don) Russell	Range Officer	Smithers	847-7443

District Staff

E. (Erwin) MacDermid	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) Kopeo	Resource Assistant - Protection	Kalum	638-3290
B. (Brian) Atherton	Resource Officer - Protection	Kispiox	842-6581
B. (Brian) Simpson	Resource Officer - Protection	Morice	845-6200
J. (Jim) Highstead	Resource Assistant - Protection	Morice	845-6200
W.T.S. (Bill) Jackson	Resource Officer - Protection	North Coast	627-0457
W. (Bill) Davidson	Resource Officer - Protection	Lakes	692-2223

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 Rv.	286-3282
T. (Tim) Ewart	Resource Assistant - Protection	Campbell Rv.	386-3282
G. (Greg) Hemphill	Resource Officer - Protection	Chilliwack	794-3361
B. (Brenda) Koro	Resource Assistant - Protection	Chilliwack	794-3361
P. (Pat) Hayes	Resource Officer - Protection	Duncan	746-5123
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. Alberni	956-4416
T. (Tim) Neal	Resource Assistant - Protection	Pt. Alberni	956-4416
B. (Barry) Millar	Resource Officer - Protection	Powell Rv.	485-9831
R. (Ron) Disprose	Resource Assistant - Protection	Powell Rv.	485-9832
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 Meeting at Winnipeg. A major Canadian event highlighting aircraft use in forestry and agriculture, will be held at Winnipeg in October (see p.46 for agenda details). British Columbia will have a significant involvement in both the symposium (three speakers) and trade show, where industry and government booths, aircraft, and a proposed Rapattack demonstration, will be featured.

Please contact the undersigned, if you require more details.

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

Inter-Regional and District Border Meetings. Region and district forest health staff from the Prince George and Prince Rupert Forest Regions recently met at Endako and Vanderhoof to discuss and resolve forest health issues of mutual concern. Regional specialists met at Endako in February to discuss pre-harvest silviculture prescription strategies, training needs, operational research projects and other concerns relevant to northern B.C. An additional meeting between protection staff from bordering districts was held at Vanderhoof in February. Districts outlined their control programs, exchanged valuable information on strategies, and resolved mountain pine beetle suppression priorities and tactics along borders between regions. Annual inter-regional meetings will be scheduled as required to deal with similar issues.

- S. Taylor and R. Hodgkinson, Prince George Forest Region, Prince George.

Western Forest Insect Work Conference. The 1990 Insect Work Conference was held in Coeur d'Alene, Idaho during the week of March 5th. The conference was well attended and informative. A summary of the conference has been forwarded to all regional entomologists.

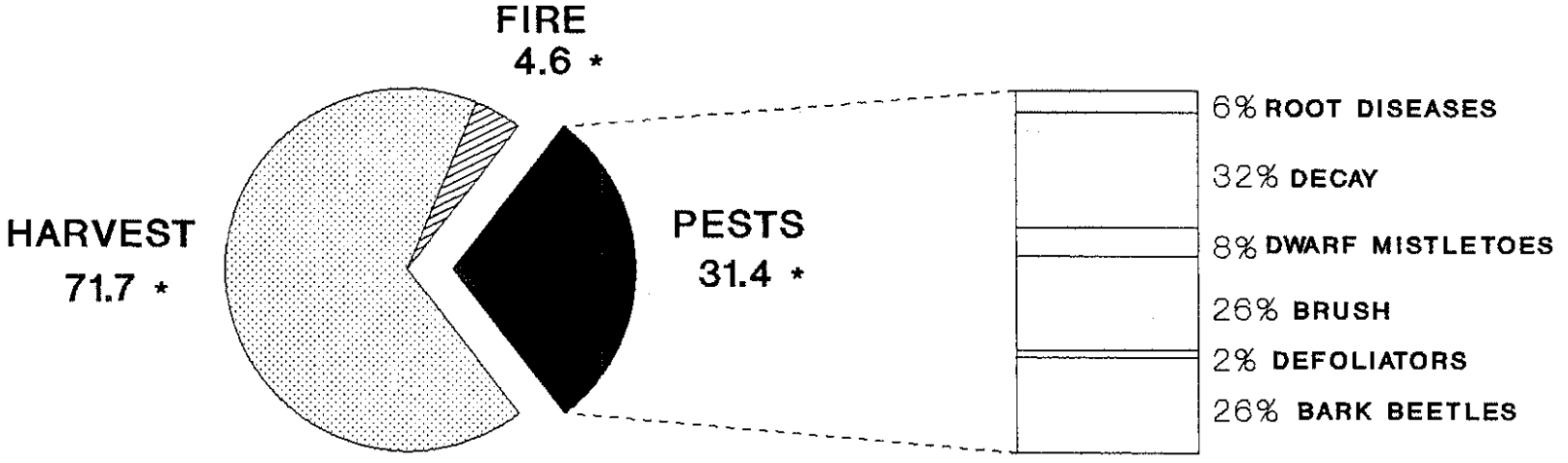
The 1991 meeting will be held in Denver, during the week of March 25th. It will be an aggregate meeting of all the regional work conferences and is being billed as a "North American Forest Insect Work Conference." The theme of the workshop-style conference will be "Meeting the Challenges in the 21st Century." Topics will include monitoring, research priorities, biotechnology, global warming, direct and indirect control, and much, much more.

The 1990 meeting has been scheduled and will be held in British Columbia, probably at a location in the Okanagan.

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

British Columbia

Average annual timber harvest, fire & pest losses for the period 1985 - 1989



* Gross estimates in millions of cubic metres
(regulated lands only)

Source: Forestry Canada & B.C. Forest Service

Field Guide To Pests of Managed Forests in British Columbia

By

Kelly E. Finck, R.P.F.
Forestry Canada, Pacific Forestry Centre
Victoria, B.C.

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JOINT PUBLICATION NUMBER 16
Endorsed by the Forest Pest Review Committee of British Columbia
ISSN 0843-4719

Canada BC

FOREST PEST REVIEW COMMITTEE
of BRITISH COLUMBIA

During the past decade, the British Columbia Forest Service, with valuable assistance from survey specialists of Forestry Canada and researchers of that organization and our universities, has made considerable progress in developing means to limit influences of damaging forest pests. These advances have been enhanced by the support and involvement in special projects by members of the Forest Pest Review Committee of British Columbia.

The Committee, composed of representatives from industry, governments, universities, and technical colleges, is pleased to endorse and recommend use of this field guide to identification of important pests of British Columbia's forests. Our success in early detection, identification and confirmation of damaging agents will be enhanced through field use of this publication.

Forestry workers, particularly those involved in silvicultural surveys, prescriptions, timber cruises, harvesting, and reforestation operations are encouraged to become familiar with the content and to participate in this phase of pest management.

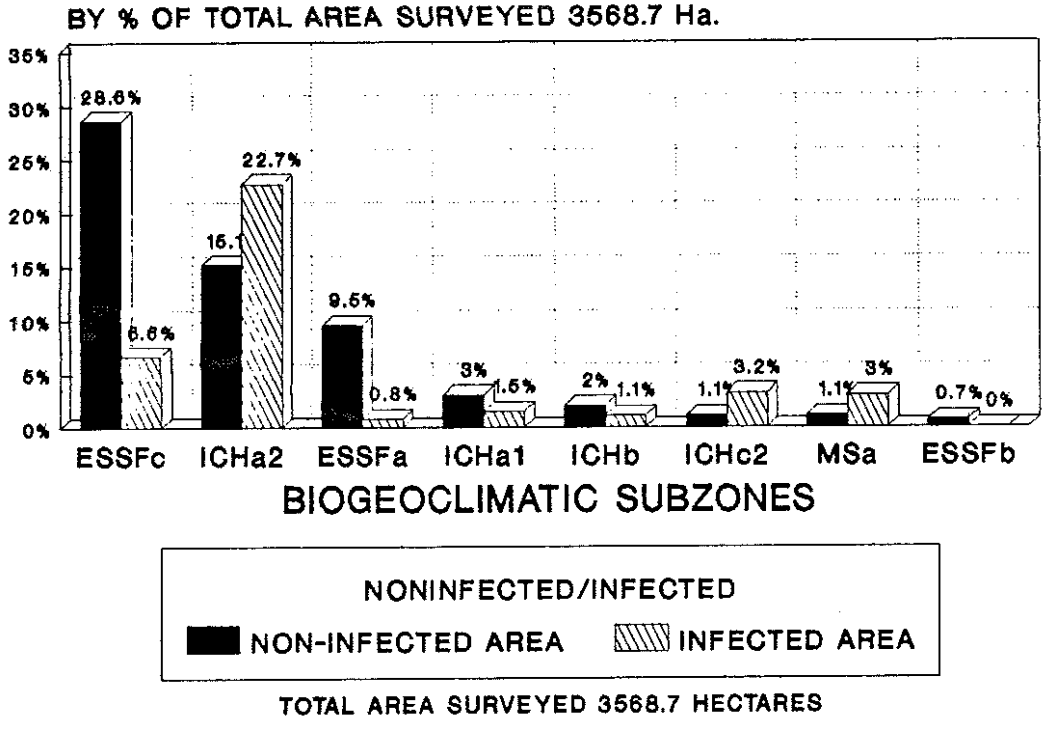
The contributions of the authors, other contributors and reviewers are acknowledged with our sincere thanks and appreciation.

J.R. Cuthbert
Chairman

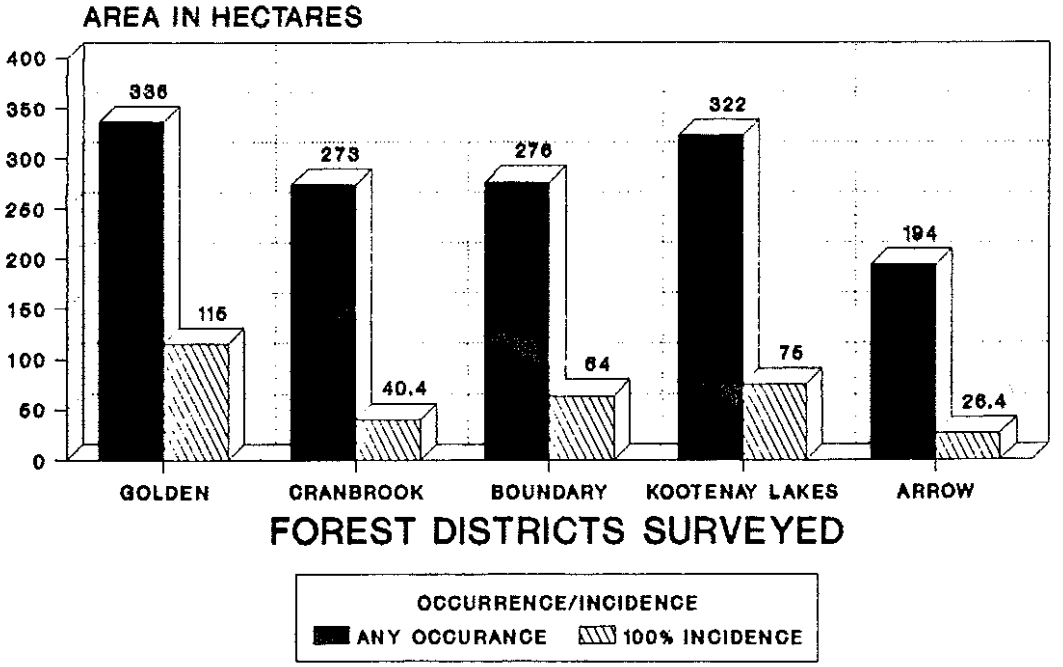
New field guide to pests of managed forests. Please refer to article on page 9 of this issue for details.

Rhizina root disease survey results. Please refer to article on page 28 of this issue.

B.G.C. SUBZONE DISTRIBUTION
RHIZINA ROOT DISEASE: NELSON REGION



PROVINCAL RHIZINA ROOT ROT SUMMARY
OCCURRENCE OF RHIZINA V/S 100% INCIDENCE



ACAFA

2ND NOTICE

Symposium and Trade Show
Holiday Inn —Convention Centre
Winnipeg, Manitoba
8 - 12 October 1990

INDUSTRIES' FUTURE NEEDS

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- Science Session
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- Spousal Program

ACAFA is the National Research Council of Canada's Associate Committee on Agricultural and Forestry Aviation

FEATURES

October 8 — REGISTRATION, RECEPTION

October 9 — GENERAL SESSION (C.H. Buckner)
- Aircraft and equipment development
- Aircraft discrimination
- Regulations — Why?
- Offshore opportunities

October 10 - 11 — SPECIAL INTEREST SESSIONS
- A Aircraft in Fire Management (Moderator: V.G. Bate)
- B Aerial Dispersal/Distribution (Moderator: J. Maybank)
- C Photography/Remote Sensing (Moderator: F. Welter)

October 11 — SCIENCE SESSION (Moderator: G. Marsters)
- The latest from the Scientific Community

October 12 — WORKSHOP (Leaders: P. Voisey, K. Price)
- General Discussion Session
- Determining Industries' Needs
- Packaging the Priorities
- Wrap-Up

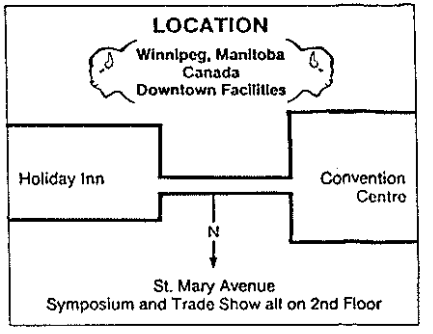
THE TRADE SHOW
- 70 Booths available at the Winnipeg Convention Centre
- More space at the adjacent Holiday Inn
- See the latest commercial innovations
- Meet technical representatives

AIRPORT DISPLAY
- At the Air Canada Hangar
- The latest in air tankers, water bombers, spray planes
- B.C. Forest Service Rapattack Demonstration
- The latest in equipment

HIGHLIGHTS

Welcome	Premier of Manitoba
Theme Speaker	Bill Ciesla (U.S. Forest Service Portland, Oregon on "Confessions of a Technology Transfer Specialist")
Luncheon Speaker	Les Kerr (Conair Aviation Ltd., Abbotsford on "R&D...getting the work done")
Banquet Speaker	Hon. Eugene Whelan (Agricultural International Associates of Canada, Ottawa, on "International developments and opportunities")

INFORMATION

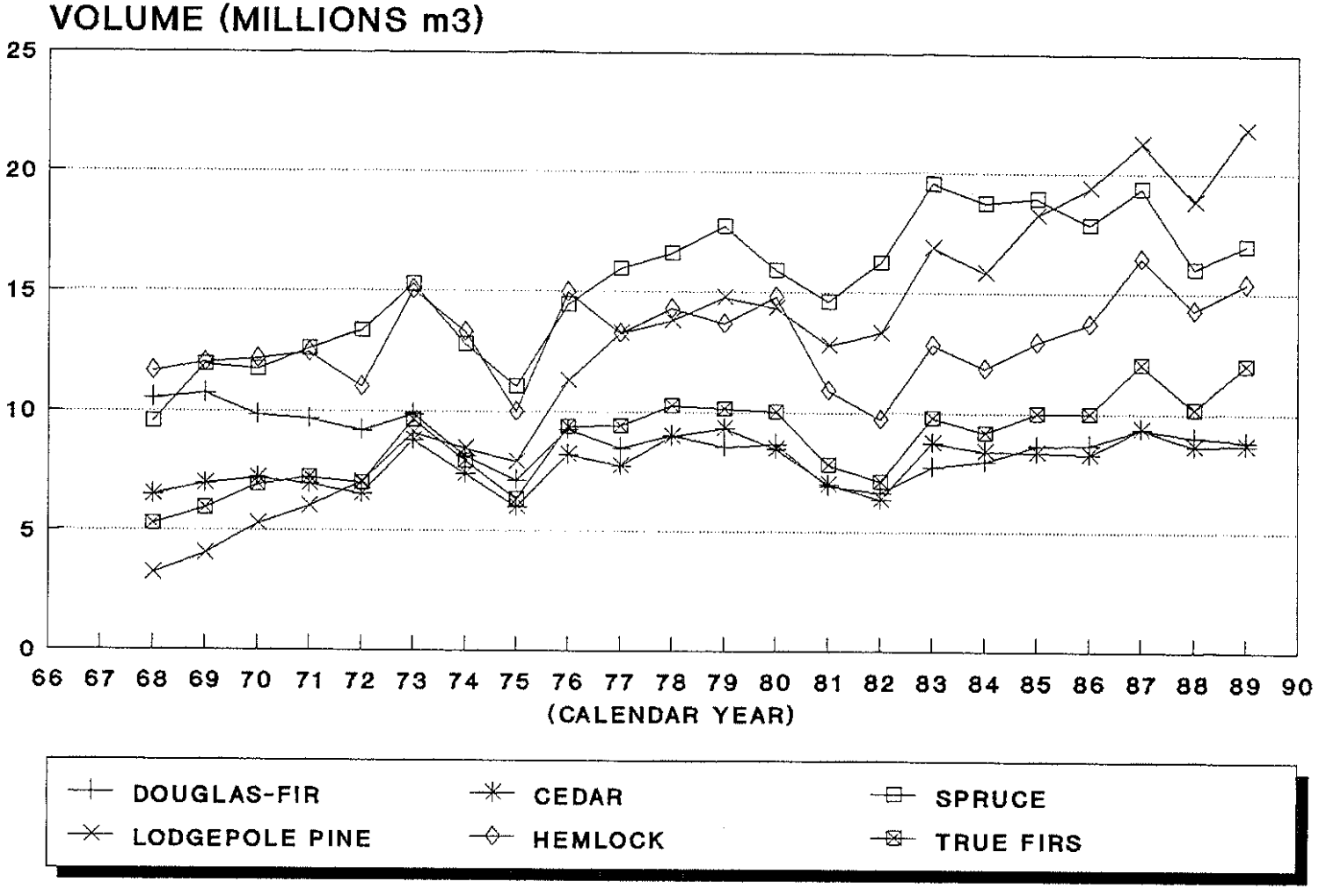


INFORMATION CONTACTS

Trade Show	Art Briggs	(204) 453-7024
	Barrie Atkinson	(204) 983-6059
	Geoff Bate	(604) 652-5360
	Steve Nicholson	(613) 545-3323
Symposium		
General Session	Chuck Buckner	(613) 721-0987
Fire Management	Geoff Bate	(604) 652-5360
Aerial Photo/Remote Sensing	Fred Welter	(403) 453-6751
Aerial Distribution	John Maybank	(306) 975-4399
Science Session	Gerry Marsters	(613) 993-0141
Airport Arrangements	Peter Armstrong	(204) 783-7267
Local Arrangements	Lloyd Yarn	(204) 945-7994
Organizing Committee	Bob DeBoo	(604) 387-8740
NRC Conference Services	Doris Ruest	(613) 993-9228

ACAFA meeting at Winnipeg. Please refer to article on page 42 of this issue.

TRENDS IN SPECIES CUT
IN BRITISH COLUMBIA 1968-1989



Source: BCFS

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Norms Compact Disc Video show production → Excellent Training Systems.