



Province of
British Columbia
Ministry of
Forests and Lands

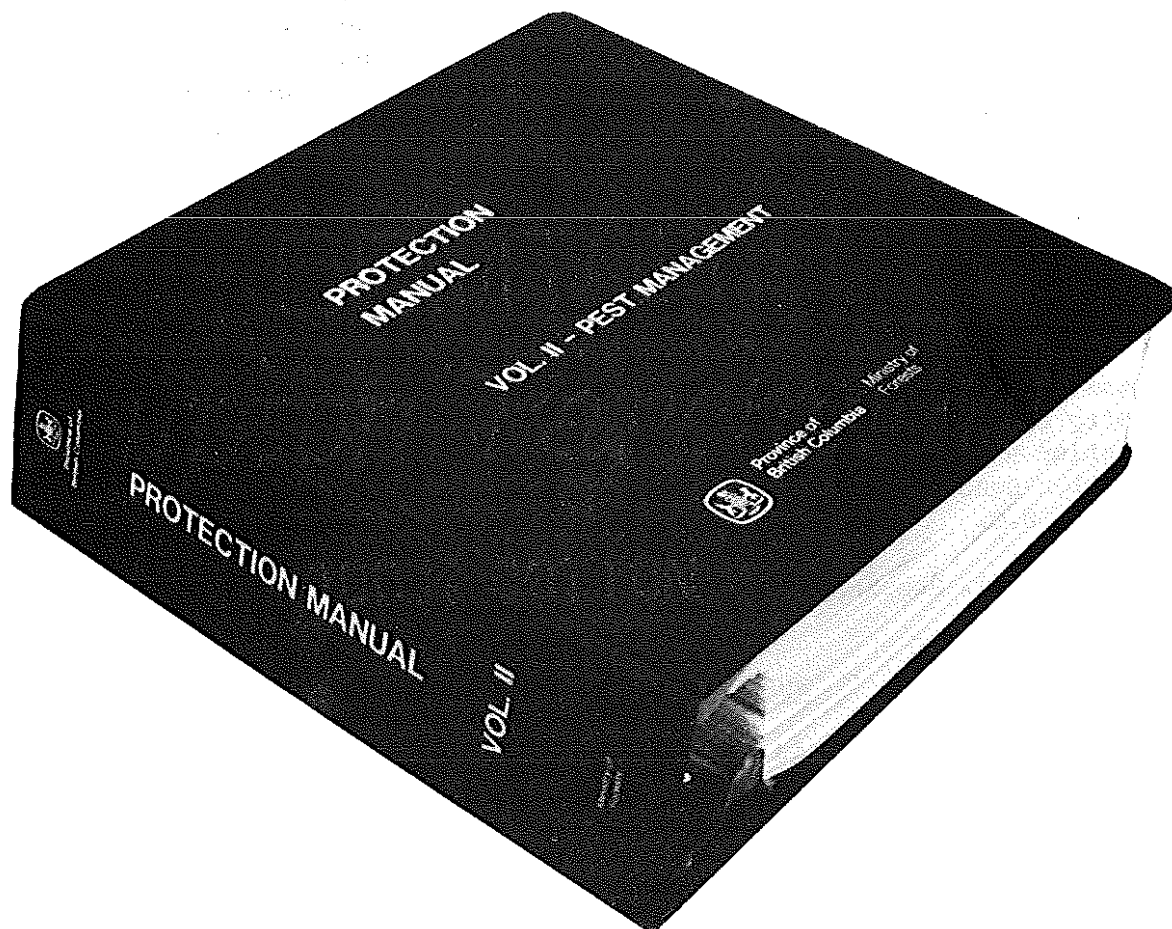
PEST MANAGEMENT PROGRESS

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

Volume VI, Number 2

(File: 190-4 PMP)

November 1987



RECOMMENDED READING!

CONTENTS

<u>SUBJECT</u>	<u>PAGE NO.</u>	<u>SUBJECT</u>	<u>PAGE NO.</u>
Pest Management - General	3	Pesticides	41
Forest Entomology	10	Personnel	45
Forest Pathology	30	Meetings	48
Forest Vegetation Mgt.	39	Tabulations and Graphics	50
Range Pest Management	40	Publications and Reports	62

PEST MANAGEMENT PROGRESS

EDITORIAL AND COORDINATING STAFF

Publisher:	R.F. DeBoo	Protection Branch
Editor:	J.F. Henigman	Protection Branch
Production:	M.J. Eddy	Protection Branch

ADVISORS

Economics:	T. Niemann	Industry, Development and Marketing Branch
Entomology:	P.M. Hall	Protection Branch
Forestry:	M. Wyeth	Silviculture Branch
Pathology:	J.A. Muir	Protection Branch
Pesticides:	J.F. Henigman	Protection Branch
Planning:	J. Crover	Integrated Resources Branch
Range Management:	R.B. Addison	Integrated Resources Branch
Research:	H.J. Benskin	Research Branch
Timber Management:	F. Renshaw	Timber Management Branch

Address all correspondence to:
Ministry of Forests and Lands
Protection Branch
31 Bastion Square
Victoria, B.C.
V8W 3E7
Attn: Ms. P.J. Humphreys

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 Pest Management Coordinator or Advisor who will edit and forward them to Protection Branch. PMP is submitted to the spring (May) and winter (December) meetings of the B.C. Forest Pest Review Committee.

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

PEST MANAGEMENT GENERAL

The New Protection Manual. The Protection Branch, with the excellent assistance of Technical and Administrative Services Branch, has recently completed preliminary distribution of the Protection Manual, Volume II Pest Management. Other volumes on Fire Management and on Air Operations are in preparation for later distribution.

The Pest Management volume has been prepared for the guidance and direction of specialized staff and for the reference of colleagues in allied disciplines. As with all first editions, it is realized that major amendments and additions will be required in the very near future. Completion and upgrading will be treated as a priority at Protection Branch.

Staff here, acknowledge the major contributions of colleagues at regional and district offices, as well as those from friends in the Canadian Forestry Service, the U.S. Forest Service, and at B.C. universities. We are counting on your continuing involvement and help in improving this basic reference in forest management.

Please address all comments and suggestions concerning content to the undersigned at 387-8740; June Tarry (at Tech. and Admin., tel: 387-5408) and Pat Humphreys (at Protection Branch, tel: 387-8737) can provide details regarding availability and cost.

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

Forest Insect and Disease Impacts in Timber Supply Areas (TSA) and Tree Farm Licences (TFL). The current document entitled "Forest Insect and Disease Impacts in TSA's" was initiated four years ago by the Forest Pest Review Committee and Chief Forester as a preliminary reference to:

- identify important pests for TSA analysis, and supply incidence and impact information on these pests;
- meet special planning or funding needs; and
- redirect research efforts.

A survey conducted by R. Cozens and G. Sutherland on the utilization of this document indicated that use was low, but recommended an update with improvements. Accordingly, methods were reviewed and changes made, and work on a companion TFL document was initiated. Revision on the TSA component of this project will begin soon.

- S. Taylor, Protection Branch, Victoria.

Timber Supply Area (TSA) Planning. The recent direction received from government to increase Tree Forest Licences from 23% to 67% of the annual allowable cut will have a corresponding decreasing effect on the size of TSAs. Pest Management and Fire Protection are issues that may need extra consideration during the boundary determination for the roll-over tenures. Please contact the Regional Planning Officer if there are any TSAs in your area where tenure types may affect protection management.

For further information, regarding changes in tenure, please contact the undersigned at 387-6656.

- J. Crover, Recreation Section, Integrated Resources Branch, Victoria.

Forest Districts Develop Pest Management Plans. Formal pest management plans have been developed by each of the nine Forest Districts in the Prince George Forest Region. The plans, completed in mid-November, describe the resource under management and options for the control of significant forest pests. Both short-term and long-term objectives are outlined to encourage a coordinated approach to forest management. Through such techniques the maximization of forest productivity will be a reality.

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

Canada - British Columbia Forest Resource Development Agreement (FRDA), 1985 - 1990 Extension, Demonstration, Research & Development (E,D,R & D)

Sub-Program. The "E,D,R & D" Sub-Program is intended to support implementation of FRDA's Backlog Reforestation and Intensive Forestry (operational) Programs over the period 1985-90. The objective is to provide solutions to technical problems encountered in implementing FRDA operations through client-oriented research, development and technology transfer initiatives. Some forest pest management E,D,R & D work is being sponsored by the Canadian Forestry Service and Ministry of Forests and Lands through Direct Delivery and Cost-Shared components of FRDA. Progress and results are communicated by a variety of methods:

- "SOLUTIONS" (the FRDA Research Newsletter: developments of interest with named contacts and phone numbers),
- "FRDA RESEARCH MEMOS" (brief reports on interim research findings of value to operations; summaries of E,D,R & D activities underway),
- "FRDA REPORTS" (comprehensive reports on individual research studies),
- on-site demonstrations,
- workshops,
- poster sessions and papers presented at Silviculture Committee meetings, Nursery Association of B.C. meetings, etc.,
- Silviculture Institute of B.C. and other education/training programs.

For further information on E,D,R & D activities sponsored through FRDA, please contact the undersigned at 387-3179 (Benskin) or 388-0653 (Coombs).

- H.J. Benskin, Research Branch, Victoria, and W. Coombs, Canadian Forest Service, Pacific Forestry Centre, Victoria.

Height-of-the-Rockies Wilderness Area. The management plan for the first wilderness area will have significant protection section incorporated in the body of the plan. This will be, in many ways, a prototype which will provide both experience in and direction to all aspects of the integrated resource management required to wilderness areas.

- J. Crover, Recreation Section, Integrated Resources Branch, Victoria.

On Pest Management and Pesticide Use Committees. Several colleagues have advised that there appears to be a proliferation or excess of pest-related committees during recent years. Although there have been new local discussion groups (usually to either deal with pest attack or pesticide use), there really are no "new provincial-scale groups on the block".

Major groups working to improve forest pest management in B.C. are included and described in the Tabulations and Graphics Sections of this issue of "Pest Management Progress". Establishment dates follow below:

- . Adhoc Committee on Forest Pesticides - 1981
- . Forest Pest Review Committee - 1974
- . Forestry (Pesticide) Issues Steering Committee - 1985
- . Pesticide Control Committee - 1977
- . Plant Protection Advisory Council - 1973

Please contact either the designated Chairman or Secretary should additional details be required.

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

Prince Rupert Forest Region Joint Meeting. A formal meeting between Resource Officers, Protection and Silviculture, was held early November 1987 and included the Regional Staff Manager, some Operations Superintendents, and many Resource Officers. Besides improved communication and understanding the most significant outcome was the strong desire to continue meeting once a year. Also an integrated task group was established to modify, revise, and develop, specific survey and treatment guidelines and procedures, for the important pests of the Prince Rupert Forest Region.

- M. Geisler, Prince Rupert Forest Region, Smithers, and F. Newhouse, Prince Rupert Forest Region, Smithers.

Pest Awareness Training Available to Field Staff. During consultations with District staff, a need for general pest identification training for field staff was identified. The scope of the training requirement was very general and quite wide-ranging in nature. In response to the identified need, a one day training session has been developed and presented. Topics covered include: the need for pest management; significant insect, disease and animal pests; recognition and identification; alternatives for control. Most important to the experience is a field session to view and discuss most of the pests in their habitat.

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

Pest Identification Training Sessions - Prince Rupert Forests Region. Field staff of four Districts in the Prince Rupert Forest Region received pest identification training. The other two Districts have requested training sessions this winter. The training consisted of a half day office session which covered about 15-20 pests followed by a 3 to 4 hour field session. A total of 60 people representing the Ministry of Forests and Lands, private consulting firms and licencees attended a coastal, and two interior training sessions.

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

Pest Identification Field Guide Prince Rupert Forest Region Update. Five hundred copies of our field guide were produced this year by Paul Wood. Few remain and we are presently looking into reprinting 300 additional copies.

If you are interested in obtaining a copy, contact the undersigned at 847-7478.

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

Pest Management Displays. In the current calendar year pest management displays and other promotional material were exhibited at 17 locations across the province. Displays are available on six topics (mountain pine beetle (MPB), root rots, Douglas-fir tussock moth, general pest management, gypsy moth and pesticides). Other material available includes a MPB model, forestry computer games and a gypsy moth mini-display. Agencies interested in borrowing this material should contact the undersigned at 387-8743.

- S. Taylor, Protection Branch, Victoria.

Aerial Sketchmapping in the Prince George Forest Region. Aerial sketchmapping was conducted in the Prince George West and Fort St. James Forest Districts on 1:40 000 scale colour-xeroxed maps, and in the McBride Forest District on 1:50 000 scale black and white forest cover maps. Vanderhoof Forest District was 'mapped' using 1:10 000 colour aerial photographs flown in the summer of 1987. The Prince George East Forest District was not mapped this year because of insignificant amounts of beetle attack and timber volume losses experienced during the previous year. In addition, the Region financed 18.0 hours of aerial survey by the Forest Insect and Disease Survey Unit of the Canadian Forestry Service. The maps produced will be used to determine timber volume losses for the Region.

- G. Ensworth, Prince George Forest Region, Prince George.

Pest Survey of Young Stands. Surveys were conducted in the Penticton and Merritt Forest Districts in young stands (6+ years old) to evaluate the incidence and severity of pest damage. The surveys consist of continuous strips, whose width varied from 1-5 m widths dependent on density. A total of 25 openings were surveyed at an intensity of 5-10% coverage. A pest manual specific for pests which could be encountered in young stands was completed. Each pest was described and included in a list of items to be recorded on survey forms when this pest was noticed. Each pest was coded and the forms

were designed so that data for all pests could be entered, in code, onto these forms and it could easily be entered into a computer at the end of the surveys for analysis. Data from these surveys will be useful in prescribing silvicultural prescriptions for these stands as well as developing pest management schemes for young stands. Most of the surveys were in naturally regenerated lodgepole pine stands simply due to its abundance in this Region. Some of the more damaging pests encountered in these surveys include:

- Cronartium comandra , Comandra blister rust
- Endocronartium harknessii, western gall rust
- Armillaria obscura
- Pissodes terminalis, lodgepole terminal weevil
- Petrova albicapitaua, & Vespamima sequence,
pitch twig moth and pitch moth

A full report of the results of these surveys, and the pest booklet and survey forms, will be available from the Kamloops Regional Office in the spring.

- L. MacLauchlan, Kamloops Forest Region, Kamloops.

Forest Nursery Pest Update. This growing season, 1987, infestations of the eriophyid mite Trisetacus spp. have been identified from pine seedlings at several nurseries. To date mites have been found in outplantings on the nursery sites and bareroot 2+0 production stock, as well as planted ornamentals and free-growing pine around the nurseries. All nursery personnel have been alerted to the mites presence and familiarized with damage symptoms. This winter the pest potential and a tentative course of action will be determined.

Root pathogens, especially Pythium, Phytophthora and Cylindrocarpon, have been increasing over the past few years and were a serious problem on several nurseries in 1987. Several small trials with the fungicide Ridomil® were conducted and initial results show that it may be promising. Best control is probably achieved through nursery sanitation and cultural practices. With the cooperation of John Dennis at Pacific Forestry Centre, a stryoblock sanitation trial was conducted. Silviculture Branch is also planning to chlorinate the water supply at nurseries where it is contaminated with these water borne pathogens.

The spruce budworm was again a problem at interior nurseries located within infested areas. Larvae can severely defoliate nursery stock, and the adults pose a further problem when they lay eggs on the seedlings because the overwintering larvae may accompany seedlings to reforestation sites. An aerial spray program using B.t. was conducted at one nursery in cooperation with the Kamloops Forest Region.

Cutworms were a problem during the summer lift of 2+0 container stock at several nurseries. These pests cause minimal damage to the seedlings and appear rather to be sheltering in this stock, however they could become a problem in plantation sites if they remain with the stock during the lift. Some nurseries were successful in controlling these cutworms using applications of bait.

Julie Brooks, a PhD student under Dr. John Borden at Simon Fraser University began her study of the lygus bug. Damage from this insect pest has now been confirmed at almost every nursery in the province and on most species of seedlings grown, however, it is not always significant. Julie has also established a lab population to begin work on isolating a pheromone.

Under Forest Resource Development Agreement, project number (coastal-Tac) #2.29, the herbicide Goal® was tested using the protocols of the National Tree Nursery Weed Control Committee at Surrey Nursery. Goal looks very promising for control of weeds in both bareroot and container culture.

Trials to control liverworts on container stock continued, two fungicides thiram and maneb and two herbicides simazine and Ronstar® were tested at several nurseries. All showed promise if applications are made when liverwort plants are just becoming established and small in size.

In cooperation with Rona Sturrock at Pacific Forestry Center, a trial to develop new controls for the balsam woolly aphid will be conducted this fall. Abies amabilis seedlings in containers were successfully infested with aphids this spring. Pesticide applications are awaiting the development of a special pesticide applicator designed for trial use.

- G. Shrimpton, Silviculture Branch, Surrey Nursery.

Forest Nursery Pest Research and Development. Preventing and controlling nursery pests is essential to the achievement of goals for producing assured supplies of high quality planting stock for the reforestation program. The question is - how are pest and other nursery problems being dealt with, in terms of research and development? In 1983, a Nursery Technical Working Committee (NTC) was established by the Directors of the Research and Silviculture Branches (MoFL) and the Pacific Forestry Centre Canadian Forestry Service (CFS) with the following terms of reference:

- review nursery practices and problems, and identify and prioritize problems in terms of research, development or operations,
- review the existing nursery research and development programs and comment on the strengths, weaknesses and gaps in the programs.

After a break of a year or two, the "Nursery Technical Committee" (NTC) was reactivated in 1986 under chairman E. Van Eerden, British Columbia Ministry of Forests and Lands (MoFL), Silviculture Branch, with a new membership -- primarily government and private nursery operations staff plus representatives from MoFL, Research Branch, Canadian Forestry Service (CFS), and University of British Columbia. Problems were identified, discussed, ranked and forwarded to the forestry research groups for attention. To ensure that issues were, indeed, followed-up, an interagency Forest Nursery Research Working Group (FNRWG) was established in 1987. Chaired by H.J. Benskin (MoFL, Research Branch) and with representation from most agencies involved in nursery-related research (MoFL, CFS, MacMillan Bloedel, Simon Fraser University, UBC, B.C. Research), this Working Group is now actively involved in developing nursery research and development strategy and assessing work underway to ensure that priority issues get dealt with and results communicated. In response to the latest list of NTC-defined information needs and priorities, the FNRWG has

developed research proposals which will be considered for funding through a variety of sources -- Forest Resource Development Agreement, (FRDA), Section 88 -- or as part of ongoing MOFL, CFS and University research programs.

- Weed control for bareroot and container stock (inc. continuation of FRDA project #2.29, Goal® efficacy trials).
- Efficacy trials with Benlate® and Ridomil® for control of Pythium, Fusarium and Phytophthora.
- Block sanitation for disease control.
- Nursery Pest Handbook (FRDA project #2.48) in progress.

- H. Benskin, Research Branch, Victoria.

Small Mammal Damage Assessment. Dr. Tom Sullivan has been awarded a Regional Consulting Service Contract to assess the level of damage in plantations in three interior Districts of the Prince Rupert Forest Region. The consultant will use information collected from at least 20 plantations on host, site, and pest relationships to develop an effective and practical control program for our Region. There are 800 - 1 000 ha of recent plantations that are known to have incurred at least some damage.

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

Porcupine Update. Dr. Tom Sullivan has been awarded a contract to complete a porcupine problem analysis for the Prince Rupert Forest Region. In addition, a sanitation spacing and protective collaring of 200 crop trees per hectare experiment in Khutzeymateen Inlet is presently underway and funded by Silviculture and Pest Control, Forest Resource Development Agreement, dollars. The bounty system open to registered trappers has netted about 20 porcupines in the Terrace area to date. A porcupine communications plan is being developed by The Kalum and North Coast Forest Districts and Region to inform the public of our need to control rodent damage inflicted on our second growth stands.

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

Infestation of Mites from the Trisetacus Persuasion. A plantation of three year old lodgepole pine in Salmon Arm was identified by Pathocon Consulting as having both Trisetacus ehmanni and Trisetacus campnodus mites affecting between 5 and 8% of the planted trees. Symptoms included chlorotic foliage, candelagra tops, dead leaders and some associated mortality. Concerns regarding other stands planted with similar stock, surrounding stands and the fate of this plantation are currently being addressed. Termination of the stand is an option. Incidentally the site was determined to have had 10% seedling mortality since planting due to Armillaria obscura.

This species of mite may be giving this Region quite a scare. It is also

causing noticeable damage in Douglas-fir plantations in Salmon Arm and Vernon in the form of T. pseudotsugae.

- H. Merler, Kamloops Forest Region, Kamloops.

FOREST ENTOMOLOGY

Nelson Forest Region Aerial Overview Forest Insect Pest Survey. The 1987 aerial overview survey for the Nelson Forest Region was again coordinated by the Region in cooperation with the Districts and the Canadian Forestry Service. A total of 55 hours were flown using fixed wing aircraft, sketch mapping infested areas onto 1:100,000 or 1:125,000 scale topographic maps.

The maps produced from these surveys are being used as an overview of current pest damage on a Regional and District basis and to prioritize areas where more detailed aerial and ground surveys are required. The number of hectares of mountain pine beetle infestations recorded in 1987 was 20 969 down from 24 000 ha in 1986, and spruce beetle was 31 down from 130 ha in 1986. Other pest damage recorded was as follows: balsam bark beetle 437; Douglas-fir beetle 2, spruce budworm (one year cycle) 2 500; (two year cycle) 7 000; and tent caterpillar 3 000 ha.

- E. Morris, Nelson Forest Region, Nelson.

Bark Beetle Funding. Approximately \$9.6 million were allocated to bark beetle and related activities for the 1987/88 fiscal year. The breakdown of the funding, as of September 30, is given below:

<u>Region</u>	<u>Allocation</u>
Cariboo	\$2,245,219
Kamloops	2,889,551
Nelson	846,807
Prince George	1,482,300
Prince Rupert	1,366,979
Vancouver	22,800
Protection Branch	190,800
Ministry of Environment and Parks (Fish and Wildlife Branches)	600,000
Total	<u>\$ 9,644,456</u>

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

Special Bark Beetle Funding Nelson Forest Region. A total of 15 bark beetle projects were approved under the special bark beetle funding with a cost of \$846,807 for the 1987/88 fiscal year. All projects are underway and will be completed by March 31, 1988. Project activities include aerial and ground surveys to prioritize areas for control actions (\$314,413); road access, and upgrade into infested and high hazard stands (\$150,136); single tree disposal (\$269,055); and pheromone containment (\$76,203).

- E. Morris, Nelson Forest Region, Nelson.

Prince George Forest Region Special Bark Beetle Funding 1987/88. The Prince George Forest Region has been allocated \$1,482,300 for the detection, monitoring and control of Dendroctonus beetles in four Forest Districts in the 1987/88 fiscal year. The 11 individual projects include semiochemical baiting, probing, colour aerial photography, single tree disposal, and post-attack injection of MSMA. As in previous programs, all activities are being monitored and audited by regional staff to ensure cost-effectiveness of expenditures. Assessments are presently underway in each District to check the development and vigour of mountain pine beetle in infested lodgepole pine. Approximately 8450 semiochemical baits were successfully deployed in the Region in the spring of 1987 to mop-up residual mountain pine beetle adults around cutblock perimeters and previous disposal sites. Disposal activities are now underway in all Districts.

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

Bark Beetle Booklet. A booklet titled "Bark Beetles - A Threat To Our Forests" has now been printed. This relatively non-technical publication discusses the impacts on the resource caused by bark beetles and describes various management approaches. The booklet follows in the series of publications which include "The Real Enemy," "Pesticides in Forest and Range Management," and "Forest Diseases and Forest Management."

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

Bark Beetle Model Contest. The Canadian Institute of Forestry, Association of B.C. Professional Foresters and the Forest Service is sponsoring a Bark Beetle Model Building Contest throughout the Prince Rupert Forest Region. The objectives of the contest are to provide an eye catching model for use in public displays, school talks and; to promote awareness and interest in forest management in general.

Eligibility is limited to interested people aged approximately 13-17 within non-profit groups and institutions.

For more information in the Bark Beetle Model Contest contact the undersigned at 847-7477.

- M. Geisler, Prince Rupert Forest Region, Smithers.

Mountain Pine Beetle in the Cariboo Forest Region. Results of surveys done this year indicate that mountain pine beetle populations have declined considerably.

Licencees have logged, or are in the process of logging, all "green attacked" stands. As a result, in the Williams Lake and Quesnel Timber Supply Area's (TSA) the emphasis in pine harvesting has shifted from the east to west and from "green" and "red" attacked stands to substantially more "red" and "grey" attacked stands. At the rate that the major licensees are logging, it is expected that by the end of March 1988 all the economically merchantable stands of "red" and "grey" attacked pine in the Williams Lake T.S.A. will be

logged. In the Quesnel T.S.A. there will still be some stands which presently do not have access, left to be addressed. Our emphasis will then shift to harvesting green stands of pine which are susceptible to attack.

In addition to the foregoing, Carrier Lumber Ltd. has now moved its Lumber mill into the Anahim Lake area and has started harvesting significant volumes of timber under its Forest Licence. With the establishment of their planer mill later this year, we expect an increase in the volumes of beetle attacked timber being salvaged from the far western part of the Williams Lake T.S.A.

In the 100 Mile House T.S.A. the licensees have reduced their overcutting of high priority pine beetle attacked stands since essentially all the "green" attacked and merchantable "red" and "grey" attacked pine stands have been addressed. There is a general shift of logging from the west to the east and into susceptible stands, but logging has reverted to a more normal level of cut.

In the 100 Mile T.S.A. the Small Business Enterprises Program is now mainly concentrating on susceptible stands of green pine because there is little beetle attacked wood left that is presently considered merchantable.

In the Williams Lake and Quesnel T.S.A.'s the Small Business licensees are still logging small patches of "green", "red", and "grey" attacked pine. In the Chilcotin Forest District however, the harvest of "red" and "grey" attacked pine has increased considerably (up 35 - 40%) and large areas of "red" and "grey" attack have been logged.

With the declining available volume of merchantable "red", and "grey" attacked pine (many stands have deteriorated to the point that they are no longer merchantable and many have too small an average diameter and height and/or are too far from the mills to be merchantable) the emphasis is shifting to logging stands of green pine that are susceptible to attack.

Throughout the Region there has been an ongoing program for treating small isolated infestations of mountain pine beetle. The program includes pheromone baiting followed by treatment of attacked trees either with MSMA or by cutting, piling, and burning.

Other than the mountain pine beetle the only other pest of significance in this Region at this time, is Ips pini (pine engraver beetle). Large outbreaks of these beetles have been showing up around the perimeters of many of the pine cutblocks throughout the Region. There is no plan of direct action against these beetles at this time. It is expected that in a year or two the population will die out. Also it is felt that many of the trees that are attacked are residuals of marginal value and that any action to harvest them would only increase the problem (because of additional slash created).

To this point in 1987 the Ministry has spent \$1,050,000.00 to construct 87.3 km. of access roads into beetle attacked areas and areas susceptible to attack.

- J. Szauer, Cariboo Forest Region, Williams Lake.

Emergency Bark Beetle Control Program in the Prince Rupert Forest Region. We are in the process of reviewing and revising bark beetle control tactics and strategy. This process is complicated by a lack of Section 88 funding and the recent changes in policy direction. However, we expect to maintain our position against the mountain pine beetle.

Early probe results indicate a ratio of approximately three current attacks to one red attack. Due to several mild winters and summers we speculate that the beetles are healthier and are flying further. We have observed that current attacks are frequently being missed since they do not occur within our standard 50 m sweep distance around red attacked trees. We are compensating with more intensive probing in our critical beetle control areas.

- M. Geisler, Prince Rupert Forest Region, Smithers.

Bark Beetle Related Harvesting. More detailed information regarding the harvesting program resulting from the emphasis on bark beetle management will be available for the spring edition of Pest Management Progress. However, a few changes in emphasis have resulted from expansion or contraction of particular infestation areas. In most Regions, the harvesting program continues to be a major component of the beetle/timber management effort and logging is being addressed as much as possible to priority infestations.

A summary of bark beetle harvesting activities within the Regions is as follows:

Cariboo: Williams Lake and Quesnel Timber Supply Area (TSA), harvesting has shifted from east to west, from green and red attacked stands to substantially more red and grey salvage stands. In the 100 Mile TSA harvesting has reverted to "normal" where susceptible stands are the target.

Kamloops: The 200,000 m³ Annual Allowable Cut (AAC) increase in the Okanagan TSA is being fully used to harvest mountain pine beetle (MPB). In addition, Okanagan area licensees are shifting more of their operations southward into the Penticton Forest District.

Nelson: No major shifts in the level of harvest for pest management are occurring. Increased cutting in the Boundary TSA is being anticipated because of increases in MPB attack.

Prince George: The pest management harvesting program continues to be a prominent part of the Region's cut. No significant changes in the magnitude and direction of the program have occurred since the information presented in the spring of this year.

Smithers: There has been no major shift in harvesting for pest management since last year at this time.

Vancouver: No major changes in the harvesting of salvage timber in the Region have occurred since reported last spring. Only 1,591.2 m³ have been salvaged due to MPB in the Squamish Forest District) of the Region in 1987.

For more information contact the undersigned at 387-5291.

- L. F. Renshaw, Timber Branch, Victoria.

Beetle-Proofing Through Thinning. There is evidence from trials conducted in the U.S.A. that thinning mature stands by a variety of diameter limit and basal area regimes, reduces such stand's susceptibility to mountain pine beetle. This technique may be a useful approach in areas such as watersheds where beetle losses must be limited while still maintaining some forest cover. Demonstration areas have now been established in the Merritt Forest District. Plots have been located in the Quesnel Forest District and will be treated in 1988. A further site has been located in the Invermere Forest District.

All areas will be monitored annually for beetle activity. For additional information contact the undersigned at 387-8742.

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

Access Trails for Beetle Management. Vernon Forest District has embarked on a program of constructing narrow width trails, about 3 meters wide within a 200 meter corridor around high value lakes and sensitive areas for the purpose of providing access for beetle management.

The trails were constructed with a small bulldozer for the purpose of providing access for beetle surveys, single tree disposal and removal of scattered infested trees. The trails have proven to be very beneficial in providing cost-effective means of monitoring and controlling insect populations in the sensitive areas.

- E. Haupt, Vernon Forest District, Vernon.

Bark Beetles Control with Horses. Horses have been used successfully in Vernon Forest District to remove mountain pine beetle infested trees within sensitive areas such as recreational sites.

Horse logging minimizes the impact on the sensitive sites and has resulted in the timber being utilized rather than felled and burned. Horse logging is being encouraged for selective harvesting in many sensitive areas.

- E. Haupt, Vernon Forest District, Vernon.

Carbaryl Use for Mountain Pine Beetle Control. The use of carbaryl for pre-emergence control of mountain pine beetle by a timber licensee in Vernon Forest District has not proven to be very successful.

The back pack spray treatment was carried out in March through application of carbaryl on the boles of felled infested lodgepole pine trees. Subsequent monitoring after beetle flight indicated beetle survival rate was high. Perhaps results would have been better if trees were treated closer to the beetle emergence period.

- E. Haupt, Vernon Forest District, Vernon.

Firsts for the Lillooet Forest District. Mountain Pine Beetle has been a major pest in the Lillooet Forest District for several years now. Last year was devoted mainly to salvage probing and detection. For the first time this year, phenomone lures (2300) were deployed and monitored. Also this year MSMA was applied for the first time in the District, wherein 1100 trees were treated.

The mountain pine beetle population is still on the rise in our District, and we also have some major spruce bark beetle infestations. However, we have "declared war" against these pests and are working hard towards an optimistic outcome!

- J. Engelsperger, Lillooet Forest District, Lillooet.

Mountain Pine Beetle (MPB) Repellent Trial in the Invermere Forest District. An operational field trial using repellents, (verbenone 75% pure) and PheroTech attractants together, was undertaken to control MPB at Panorama Resort. A combination of funnel traps and tree baiting was tried. Any green attack lodgepole pine identified were treated using MSMA. The work was completed with the assistance of Panorama Resort staff and the University of Calgary. The purpose of the trial was to reduce the future impact of MPB from the 1988 flight by removing a high proportion of the 1987 flight.

Initial results indicate a reduction in the 1987 population with the repellents providing some protection of susceptible pine. A report should be completed by early 1988. Part of the program included preparing a legal agreement with Panorama and training two of their employees to continue the program in 1988.

E. Begin, Invermere Forest District, Invermere.

Beetle Proofing Trial in the Invermere Forest District. A beetle proofing trial is being set up to determine if a reduction in the number of stems per hectare can be used to maintain forest cover with relation to mountain pine beetle pressures. Fish, wildlife and recreation concerns will be addressed. The trial is being conducted on a recreation area composed of 95 percent lodgepole pine. If successful, other recreation areas and fish and wildlife corridors may be treated in this way. Silviculture, logging, and protection concerns will be reviewed to ensure proper forest management is maintained. The work is being done in consultation with Protection Branch and the Canadian Forestry Service (Terry Shore).

- E. Begin, Invermere Forest District, Invermere.

Productivity of Debarkers (estimates). Recently, the Cranbrook Forest District purchased planer heads which fit on the end of a standard chain saw (over 57 cubic inches). This device was designed to peel and notch logs during log home construction. Our intention was to use the planer heads in mountain pine beetle control.

Although the cost of each unit was expensive (\$200/unit), it was thought that the cost benefit accrued would balance with increased productivity. After a very brief trial period using these planers to debark mountain pine beetle (MPB), infested trees, a variety of problems have surfaced.

Productivity of the planer head is estimated as low. The equipment did not prove to be durable either because of equipment design or the manner in which it was used. Specifically, the planer blades separated from the unit and the sealed bearings wore out. Additionally, sap collected on the cooling fins of the chain saw resulting in the failure of the chain saw engine. By comparison to normal fall and burn, the debarker operates at 20% of the fall and burn productivity. The drier the green attacked trees the longer it takes to debark.

Preliminary results suggest that the debarkers would be useful during fire season when fall and burn is not an available option. However, the consensus is that it is too early to produce an accurate cost benefit analysis on the debarkers due to the short period of time they have been utilized.

- R. Allen, Cranbrook Forest District, Cranbrook.

Post-attack treatment of Mountain Pine Beetle (MPB) with MSMA in the Prince Rupert Forest Region. Two operational hack and squirt projects using MSMA against MPB were completed successfully in the Lakes and Morice Forest Districts.

In the Lakes Timber Supply Area (TSA), 850 trees were treated in 8 days at a cost averaging \$19.57/tree. Eight men in two crews were transported by helicopter to treat four previously pheromoned sites. In addition, at least 100 m surrounding the attacked trees was checked to ensure that all of the current attacked trees were treated. Normal probe and fall and burn costs for this site would have been about \$100/tree. A quick assessment of ten treated trees on November 2 revealed that almost all brood was dead or was severely suppressed in development. There were a few untreated current attacks found that were obviously infested after the MSMA treatment suggesting that the project should have been delayed for 1 to 2 weeks.

The treatment in the Morice TSA occurred on a road-accessed site on Morice Mountain, 18 km south of Houston. Average costs for treating 337 trees and completing a 100% probe of about 300 ha was \$4.29/tree. The treatment took 4 days using two 3 man crews. Ten trees were examined on October 30 and 93% of the galleries observed had no live larvae. Of the living larvae, few were expected to survive the winter as they were apparently sickly or suppressed in development. Larvae were rarely surviving through the second instar and first instar mortality was the most common. A final assessment of wood emergence will be made this summer.

Because of the cost-savings and apparent success of both projects, the Bulkley, Morice and Lakes Forest Districts are applying for District-wide permits in anticipation of using MSMA in a large-scale program this summer.

The main target areas will be hill-tops and ridges with chronic MPB infestations where fall and burn can be replaced. The likely treatment areas will be identified to Fish and Wildlife Branches during a January meeting that should allow us to resolve any potential conflicts well before the treatment date.

To prepare for the large-scale MSMA program, plans are being made for monitoring the MPB flight, for training project managers and for certifying more pesticide applicators. Installation of Lindgren funnel traps combined with regular ground checks will be done to ensure that the MSMA treatment occurs within the two to three week window.

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

Bark Beetle Control in Manning Provincial Park. Parks, B.C. Ministry of Environment and Parks, over the past six years, have been doing an excellent job of controlling mountain pine beetle within Manning Park. Starting with the relatively large project at Eastgate in 1982 and continuing with annual semiochemical baiting and single tree fall and burn, they have been able to successfully and effectively control this bark beetle. This year, because one of the primary reasons for this control effort is to protect commercial stands adjacent to the Park, the Forest Service agreed to help fund it via the Bark Beetle Program. Also, for the first time, this year Parks Branch have started using MSMA. One hundred and fifty two trees were felled and burned; 145 were baited; and 176 trees were treated with MSMA shortly after beetle attack. It is planned that this control effort will be maintained in 1988.

- D. Heppner, Vancouver Forest Region, Burnaby.

Mountain Pine Beetle Insecticide Trials. In October 1986, spray applications of the insecticide chlorpyrifos were made on bolts of lodgepole pine infested with developing mountain pine beetle larvae from an attack in July 1986. Bolts were treated with either: (1) chlorpyrifos at 5% (a.i.) in AWK oil; (2) AWK oil alone; or (3) left untreated to serve as checks. AWK oil is a low aromatic content mineral oil. Efficacy sampling occurred on June 18-19, 1987 - some 8 months after treatment and approximately one month prior to expected adult emergence. Both AWK oil alone and in combination with chlorpyrifos at 5% a.i. were effective in killing 93-95% of mountain pine beetle larvae in treated bolts. There was no significant difference between the efficacy of the chlorpyrifos formulation and the AWK oil alone. A summary report is being prepared listing results from this trial and others and it will be available in early 1988.

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

MSMA Operational Trial - Cranbrook Forest District. The Cranbrook Forest District carried out an operational trial using the pesticide MSMA on mountain pine beetle for the first time this year (1987). Two sites were chosen for the application.

In June of this year aggregate pheromones were placed on 20 susceptible lodgepole pine at the two locations, the early placement of pheromones was due to higher than normal spring temperatures in the District. In early July the sites were revisited, this time to treat MPB infested trees with MSMA (Glowon®). A total of 54 trees were treated with chemical.

Post-flight inspection of both of the areas at the end of August showed that all the MSMA treated trees had begun to turn red. Further investigation in late September showed that all treated trees, and the accompanying beetles which had attacked the trees, were dead. It was noted that, additional trees close to the pheromone baited and MSMA treated trees were attacked after what would be considered a normal (July-August) attack time frame.

In the Cranbrook Timber Supply Area (TSA), the average cost of single tree treatment, using the fall and burn method, is approximately \$11/tree. The cost of using MSMA, under perfect conditions, was approximately \$10/tree. This is based on one-time treatments for both methods. The weather conditions this year resulted in two and possibly three separate beetle emergence flights. Consequently, the follow-up checks had to be increased from the normal one to correspond with the number of flights. If more MSMA had been available, the newly attacked trees would have been treated. This would have meant an increase in the average cost per tree.

We feel that in a "normal" year the cost-benefit regarding single tree MSMA treatment versus pile and burn would be in favor of the MSMA method. This year, because of the vagaries in the weather and the increased monitoring needed to contain the beetle, the pile and burn operation was more efficient.

- R. Allen, Cranbrook Forest District, Cranbrook.

Mountain Pine Beetle Suppression with MSMA. The first operational use of MSMA against mountain pine beetle in the Prince George Forest Region was undertaken in the Vanderhoof Forest District in 1987. Following a large pheromone baiting program in the spring, a total of 169 lodgepole pine infested with mountain pine beetle were injected with MSMA in early August. Field assessments in mid-September revealed that post-attack injection of MSMA on infested lodgepole pine was very effective if a proper application had been made within three weeks of the attack. In some areas the mountain pine beetle flight extended well into August thereby necessitating the need for a second treatment period. A "standard operating procedure" for the operational use of MSMA against mountain pine beetle is being prepared in the Prince George Forest Region. Ongoing training and intensification of the program is expected in 1988.

- M. Dittaro, Vanderhoof Forest District, Vanderhoof, and R. Hodgkinson, Prince George Forest Region, Prince George.

Mountain Pine Beetle in the Maple Ridge Forest District. The first recorded occurrence of mountain pine beetle in the Maple Ridge Forest District has been located 4 km east of Chehalis Lake. No commercial values are threatened.

- J. Kouwenhoven, Maple Ridge Forest District, Maple Ridge.

Mountain Pine Beetle in Western White Pine. The mountain pine beetle is building up in the white pine component in the Birk Creek area of the Kamloops Forest District and throughout the white pine component in the Clearwater Forest District. In 1986 MSMA was used to curb the build-up in the Birk Creek area. Within 15-25 cm of the frill, larval mines were very short (4 mm) and all brood was dead, however, all breast height and higher brood development appeared normal and the success of the MSMA-treatments was doubtful.

Two MSMA-treated pine were felled and sections cut at breast height, 5.0, 9.0, 12.0 and 15.0 m to monitor beetle emergence. Adults emerged from all sections. Bark samples from each of these samples and foliage samples were taken for arsenic analysis.

MSMA-treatments were done again to attacked white pine in this area and brood survival will be monitored.

- L. MacLauchlan, Kamloops Forest Region, Kamloops.

Spruce Beetle Pheromone Trial in Invermere Forest District. The Ministry of Forests and Lands working with Crestbrook Forest Industries and the University of Calgary have conducted a spruce beetle pheromone trial on TFL 14. Preliminary results indicate this method may be useful for monitoring and controlling spruce beetle with reduced logging costs.

A report is being prepared by the University of Calgary and further information is available from the undersigned at 342-4250.

- E. Begin, Invermere Forest District, Invermere.

Lethal Trap Trees in the Cassiar Forest District. For the first time, the Cassiar Forest District is planning to use lethal trap trees to control a small outbreak of spruce beetle along the highway corridor connecting Haines, Alaska, with Haines Junction, Yukon Territory. The treatment area will be the right-of-way portion contained within the Cassiar Forest District.

The beetle outbreak resulted from numerous wind-thrown trees along 17 km of the highway in 1986 and, in 1987, surveys revealed that it contained a large population of spruce beetles. A buck, pile and burn program plans to eradicate pockets of beetles and the lethal trap trees will be used to treat the remaining beetles in the scattered blowdown along the highway.

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

Balsam Depletion Plots in the Bulkley Timber Supply Area (TSA). Inventory section has just completed its first year assessment of four depletion plots established in pure subalpine fir stands. Two objectives of the plots are to 1) determine the rate at which the balsam degrades from merchantable "Dead, Potential" (DP), to unmerchantable "Dead, Useless" (DU); and 2) to record the rate of needle drop to facilitate aerial detection of balsam mortality. Only four trees (of 222 examined) were killed by western balsam bark beetle since last year. These trees will be examined annually to record the length of

needle retention. Three of 18 grey trees degraded from "DP" to "DU". This survey will be repeated annually for four more years.

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

Douglas-fir Beetle in the Lakes Timber Supply Area (TSA). A small pocket of 30 or more overmature interior Douglas-fir on the north shore of Francois Lake were killed by Douglas-fir beetle. This infestation is probably the first one documented in the Prince Rupert Forest Region although the insect has frequently been reported in the neighbouring Vanderhoof Forest District of the Prince George Forest Region. Because Douglas-fir occurs only in small pockets in the Lakes TSA, this discovery constitutes more of a curiosity than a problem.

The District plans to salvage log this small but valuable stand of timber. However, the stand lies within the Francois Lake visual corridor so landscape concerns must be addressed.

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

Ips pini, Pine engraver beetle. During 1986, there was indications that the Ips pini, pine engraver beetle damage was increasing. This was accepted as a normal condition because of the large population that would exist after a large mountain pine beetle infestation collapse. It was expected that 1987 should see some decrease in Ips attacks, however, aerial surveys indicate that there was a major increase in engraver beetle-kill, especially along roads and the boundaries of cutblocks. A field trip meeting was conducted with guests from the Canadian Forestry Service, Drs. Safraniyk and Shore, Forest Insect and Disease Survey Ranger, Dick Andrews, as well as representatives from the Prince George Forest Region and the concerned Cariboo Forest Districts. The preliminary conclusions from the meeting indicate that because of the initial high populations of Ips from the mountain pine beetle infestation, the logging slash produced during the winter by the roadside logging system practiced in the Cariboo Forest Region is further exacerbating the Ips problem.

Some specifics regarding the scenario in the Cariboo Forest Region: the Ips pini emerged from the duff probably in late April through May and attacked the slash produced during the winter as well as surrounding trees. The parent beetles re-emerged in about two weeks and attacked further standing trees. The first of three generations started emerging from the slash and they also attacked standing trees. Based on the fading characteristics of the infested trees the bulk of the trees were killed prior to mid-July.

The standard recommendation for reducing populations of Ips pini in the future would be to burn the winter slash either concurrently or prior to the engraver beetle emergence from the duff in late April. This recommendation is being considered along with some work with trap trees and pheromones.

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

Western Spruce Budworm Program, Kamloops Forest Region. The area within the Kamloops Forest Region defoliated by the western spruce budworm, Choristoneura occidentalis, has increased in 1987 to a total of 820 000 ha which is more than double the area defoliated in 1986. This encompasses areas from Lillooet to Avola and South to the Okanagan Valley. Heavy defoliation also occurred in the Shuswap/Skimikin area of the Salmon Arm Forest District. The budworm is active in almost all of the Douglas-fir type within the Kamloops Forest District with about one third of this area having moderate to high level of defoliation and one-sixth of the area suffering extreme levels of defoliation. The remaining areas were lightly defoliated. The budworm population shows no sign of "collapsing", however it is shifting in distribution and intensity. Areas which suffered extreme defoliation in 1986 were only moderately defoliated in 1987 and vice versa.

In the spring of 1987 the Forest Service, with help from the Canadian Forestry Service, (C.F.S.), designed and implemented an operational trial to determine the feasibility of protecting stands from the budworm using Bacillus thuringiensis (B.t.) at a dosage rate of 30 B.I.U.'s per hectare. Our long-term objectives were to evaluate the impact of the budworm in multi-age stands in both their natural and disturbed (selectively logged) state. Thirty-two permanent sample plots were established in the Kamloops Forest District in natural and disturbed stands in the Interior Douglas-fir ecological zone (IDFa and IDFb subzones) which has a minimum of two years of moderate to severe defoliation.

The spray blocks incorporated half of the permanent sample plots (P.S.P.) and totalled about 890 ha. Defoliation estimates, whole tree and current year foliage (Fettes 1950), top kill and mortality estimates were done before bud flush and again in the fall, and will be continued on an annual basis until five years following the budworms collapse and then at 10 year intervals.

Foliage protection was achieved in both understory and overstorey in 6 of the 11 blocks treated with B.t. Three of these six locations received a second treatment of B.t. four to five days following the first. Very minimal foliage protection was achieved in selectively logged blocks in either the IDFa or IDFb. Slightly more protection was seen on disturbed block in the IDFa than those in the IDFb. Very good foliage protection was achieved on blocks treated in the IDFb, and to a lesser degree in the IDFa, which were classed as natural.

The variable success obtained in this trial was primarily due to uneven bud phenology and larval development in the different canopy layers. To overcome this problem double applications should be considered, or switching to a chemical insecticide such as carbaryl.

Additional plots are expected to be established in 1988 throughout budworm affected sites. Treatment recommendations will depend on final assessment of the 1987 program; however, a minimum 1988 program will likely include retreatment of already established blocks.

Long-term management schemes must be considered and implemented to properly address this situation. Some options are:

1. species diversification - manage for ponderosa and lodgepole pine as well as Douglas-fir.

2. In the IDFB, try silvicultural systems other than all-age management.
3. Spacing of all age classes.

- L. MacLauchlan, Kamloops Forest Region, Kamloops.

Spruce Budworm in the Fort Nelson Forest District. Branch sampling for overwintering second instar spruce budworm larvae, Choristoneura fumiferana, was conducted by Forest Service staff in March 1987 in various locations in the Ft. Nelson Forest District. Larvae were subsequently extracted from branches by staff of the Forest Insect and Disease Survey Unit (Canadian Forestry Service) in Victoria. Results indicated continued defoliation could be expected in 1987 on both mature stands and young plantations. Indeed some 60 000 hectares of light-to-moderate defoliation occurred in the District in 1987. Of greatest concern are several seed production stands on highly productive sites along the Ft. Nelson River. Some additional defoliation has also occurred in three to five year old spruce plantations directly adjacent to mature reserves. Consequently, an application has been submitted to the Pesticide Control Branch requesting authorization to treat a total of 150 ha of mostly mature spruce with Bacillus thuringiensis (B.t.) in 1988. This will be the first trial of an aerial application of B.t. against C. fumiferana in B.C.

- R. Cozens and R. Hodgkinson, Prince George Forest Region, Prince George; and G. Vanderkwaak, Fort Nelson Forest District, Fort Nelson.

Defoliator Status Report, Queen Charlotte Islands. For the past three years severe defoliation by blackheaded budworm (Acleris gloverana) and hemlock sawfly (Neodiprion tsugae) has been widespread throughout the Queen Charlotte Forest District. This years aerial detection surveys indicate populations have declined. The survey maps have yet to be digitized but the total area infested is estimated at approximately 35 000 ha as compared to 44 360 ha in 1986.

This year is the first time since the infestation started (1985) that significant tree mortality levels have been recorded. The bulk of the damage seems to be concentrated in 30-50 year old second growth hemlock types. In some stands mortality levels were estimated as high as 80%. Most stands defoliated heavily for two or more consecutive years have sustained some permanent damage.

The current epidemic has forced the District and licensees to adjust harvesting plans. In addition, silviculture spacing projects have been temporarily delayed; some projects have gone ahead with the stems per hectare specifications increased to allow for the insect damage.

- B. Simpson, Queen Charlotte Forest District, Queen Charlotte City.

Weevil Resistance in Sitka Spruce. Larvae of the leader weevil (*Pissodes strobi*) kill leaders of young Sitka trees by feeding in the cambial zone and girdling the stem. Infestation is so severe in places on the west coast, particularly at the head of inlets, that there is reluctance to replant these sites with sitka spruce, although the species is highly productive and valuable. Infestation of a sitka spruce provenance test site, planted in the Sayward Forest in 1974, showed some provenances were less affected by the weevil than others. Some of the resistant provenances are being tested by Research Branch on another site near Zeballos by grafting, with a view to breeding from confirmed resistant provenances.

Resistance to the weevil may be related to several factors including (1) needle arrangement on the leader (adpressed needles may discourage egg laying), (2) chemical factors (such as monoterpenes and isovalerate compounds) and (3) the ability of the attacked tree to resume apical dominance. The last may be of much importance because some trees appear to have their leaders killed in several successive years but maintain apical dominance and eventually grow into normal trees after a few years. Other trees do not resume apical dominance and become bush-like in growth form.

Clonal propagation of sitka spruce may prove a faster means of obtaining resistant planting stock than through breeding because of the complicated nature of resistance. To this end cuttings were taken from 15 of the largest resistant trees and, for controls, 5 of the most severely affected bush-like trees growing, at the Sayward test site in February 1986. These were rooted with varying success and clonal hedges are being established so that adequate plants can be obtained from each clone for further testing. Sitka spruce roots quite easily following hedging (van den Driessche 1983) and shows little sign of physiological aging for many years. Thus it may be possible to produce resistant clones on an operational scale using selected hedges.

- B. van den Driessche, Research Branch, Victoria.

Weevil and the Role of Genetic Resistance in Reforestation. Paul Wood, in his report "Development of sitka spruce phenotypes resistant to the spruce weevil, (B.C. Forest Service Internal Report PM-V-10) a summary of recent and planned research projects in B.C.", correctly stated that development of resistant phenotypes of sitka spruce is unlikely to be a pancean solution for the control of coastal weevil infestations. However, resistance, no matter if it is genetic, physiological, morphological or of escape/avoidance in nature, has to be an important component in order for any pest management scheme to be successful. Any pest management should be conceived only as a measure to reduce pest impact, not to eradicate the pest. Pests will stay with us forever. In the case of sitka spruce weevil attack, even a moderate success, say 10% reduction, can be a substantial economical return in view of the high value of sitka spruce wood. Resistant sitka spruce may be of particular significance to the intermediate hazard zone.

We recommend:

1. Intensive selection and breeding for genetic resistance should not be contemplated at present.

2. Gradually build-up putative resistant trees which will eventually be incorporated into the breeding population and seed orchard.

Potential sources of resistant material:

SOURCE	NO. OF CLONES	STATUS
Green Timber	4	in clone bank & being tested
Sayward provenance test	12	in clone bank & being tested
Nootka Is.	4	identified by SFU
Nass Rd/Kitimat provenance tests	15 (approx.)	selection in 1988, propagation in 1989
Natural populations in Big Qualicum areas*		
ITT Rayonier ** family tests		at least another 5 years before selection

* Provenance tests results indicate Big Qualicum area is a potential source of resistant individuals. Sitka spruce seeds should be gathered from as many trees as possible whenever there is a cone crop. Followed by progeny tests in heavily weeviled area for future selection.

** 80 families tests in 4 locations in coastal Washington.

3. Mass vegetation propagation (root cutting) of these putative resistant clones by Bob van den Driessche for commercial planting in the intermediate hazard sites were identified by Heppner, D.G. and P.M. Wood, 1984. Vancouver Region. Sitka Spruce Weevil Results (1982 - 1983). B.C. Forest Service Int. Rep. PM-V-5, 30 p.
4. Support research to identify morphological and phenological factors which is related to tree's capability to deter weevil attack or recover from attack. To the contrary, biochemical trait (pheromone or monoterpenes) is not likely to be an effective indicator of resistance.
5. Continue clonal test in heavy weevil sites to screen resistance genotypes.

- C. Ying, Research Branch, Victoria, and J. Russell, Research Branch, Mesachie Lake.

FRDA Spacing trials to compare *Pissodes terminalis* attack incidence in different stand densities. Four spacing trials to study the distribution, behaviour and impact of *Pissodes terminalis* in different stand densities were set up in three Districts in the Kamloops Forest Region. Each spacing trial consisted of sixteen 50 x 50 m blocks and each block received one of 4 treatments: 2.0 x 2.0 m spacing, 2.5 x 2.5 m spacing, 3.0 x 3.0 m spacing and, no treatment.

The treatments were randomly assigned to the replicated blocks, and the appropriate spacing was measured out with all leave-trees marked. The blocks will be assessed in 3 years at which time a 100% survey will be done of each block. All attacks will be mapped and the following data collected: height, dbh, year of attack, height to year of attack, height for each year from 1987-1990 (for unattacked trees), defect resulting from attack, other pests. This study will aid in our future management decisions in young P1 stands.

Funding was through the Federal direct delivery FRDA program, and this was just one of many projects initiated under this grant. For further information please contact the undersigned at 828-4177

- L. MacLauchlan, Kamloops Forest Region, Kamloops.

Spruce Leader Clipping and Parasite Augmentation Trials. In August of 1987, a joint trial between Canadian Forestry Service and Ministry of Forests and Lands, Golden Forest District was conducted to clip leaders infested by Pissodes strobi and allow the weevil parasites to escape.

The technique involved clipping the leaders and placing them in screened containers. The screen was of a precise mesh size that contained the weevils and permitted the parasites to escape. The containers were filled and left in the plantation block where they will remain until next fall.

The project used eight people from the JobTrac Program and took three days to complete. A total of 800 leaders were clipped from a 65 ha block. An alternate site was left unclipped as a untreated check.

- S. Moss, Golden Forest District, Golden.

Canadian Forestry Service (CFS), Predator/Parasite Enhancement Study near Terrace. The CFS, in co-operation with the Kalum Forest District, has established a replicate of its Pissodes strobi predator/parasite enhancement trial in an isolated plantation along Hwy. 16 about 20 km east of Terrace. JobTrac crews sponsored by the Kalum Forest District clipped this and other plantations and placed the infested leaders into 45 gal. barrels enclosed with mesh of a special diameter. This mesh permits the natural enemies to escape while entrapping the adult weevils. The barrels are placed throughout the test plantation in an attempt to increase weevil brood mortality and ultimately reduce the number of new attacks two summers from now.

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

Predator/Parasite Enhancement for Leader Weevil Control. The B.C. Forest Service, MacMillan Bloedel Limited (MB) and CIP Inc. are jointly cooperating to assist the Canadian Forestry Service with field trials associated with ongoing research on weevil control. In previous control attempts, spruce leaders infested with Pissodes strobi have been clipped and destroyed, killing weevil broods that could overwinter and attack new trees. Unfortunately, such clippings also destroyed associated weevil parasites and predators which have been shown to have a significant effect in controlling weevil populations. These trials are to test if weevil control can be obtained by enhancing the natural populations of predators and parasites in conjunction with leader clipping.

Selected spruce plantations within four general areas, Benson River (Tree Forest Licence (TFL) 39, M&B), Artlish River (Timber Licence (TL), CIP), Nesook Bay (TLF 19, CIP), Westside Road (TFL 19, CIP), were clipped as in previous projects, but without the destruction of infested leaders. The infested leaders were placed in screened cages which hold the weevils but allow the predators and parasites to escape into the plantation. Additional infested leaders, from other infested plantations, were added to enhance the natural level of parasitism and predation.

Unfortunately, this year, possibly due to weather influence, weevil populations on the west coast expanded dramatically, e.g. from 50 infested leaders in 1986 to 800 this year, compounding our efforts. We are, however, optimistic that these trials will still achieve our objective and yield useful information.

- D. Heppner, Vancouver Forest Region, Burnaby.

Gypsy Moth. The B.C. Forest Service continued to participate in the cooperative pheromone trap survey program. Cooperating agencies include: Agriculture Canada, Plant Health; B.C. Forest Service; Canadian Forestry Service (FIDS); and, others. In 1987, B.C. Forest Service staff placed approximately 1,805 traps in recreation sites and other high use forested areas. The Forest Service also assisted in egg mass surveys. Results of all trapping and egg mass surveys indicate gypsy moth populations in Kelowna, Colwood (Victoria), and Parksville. These are localized populations and eradication programs will likely be implemented in these areas in the spring of 1988. The Forest Service will assist in these operations to whatever extent possible.

Eradication efforts against gypsy moth in B.C. have been successful to date. These programs have prevented gypsy moth from becoming established in the province - therefore, continued efforts on detection surveys and eradication where required will indefinitely postpone the need for large scale management programs. The Forest Service will continue and will augment its support of this preventative strategy.

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

Gypsy Moth Pheromone Traps. Two hundred pheromone baited gypsy moth traps were placed out by District staff in all seven Districts of the Nelson Forest Region. No gypsy moths were caught in any of the 200 sticky traps.

- E. Morris, Nelson Forest Region, Nelson.

Gypsy Moth Monitoring in the Prince George Forest Region. A total of 53 pheromone-baited delta traps were deployed by Forest Service staff in the Prince George Forest Region in 1987 to monitor for possible gypsy moth incursion. Traps were placed in high-use Forest Service recreation sites in five Forest Districts and in the villages of McBride, Valemount, and Tete Jaune Cache. The project was in cooperation with the Canadian Forestry

Service and Agriculture Canada who baited other forested locations. None of the traps captured any gypsy moths, and it is expected that further monitoring will be undertaken in 1988.

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

Black Army Cutworm. This insect pest of plantations continues to be of concern in several Regions. Studies conducted by a contractor under Forest Resource Development Agreement are continuing to develop prediction and survey methods and to refine hazard assessments.

Results of this year's study will be reviewed in the winter and interim guidelines are expected to be prepared to assist in making planting decisions this coming spring.

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

Black Army Cutworm Infestations - Nelson Forest Region. In the spring of 1987 infestations of black army cutworm were found in areas burnt in 1985 in the Invermere and Golden Forest Districts. In the Invermere Forest District high larval populations were found in a number of areas within the boundaries of two wildfires at Ram Creek (16 000 ha) and Gibby Creek (3 000 ha). Large scale planting projects were underway or about to start when the infestations became apparent. Ground surveys were conducted to determine areas of infestation so that planting schedules could be adjusted to minimize damage to the new seedlings. The uninfested and low larval population areas were planted first, then moving onto the high larval population areas after larval feeding had finished.

Damage appraisal plots have been established to assess the impact of larval feeding. Pheromone trap surveys indicate continuing infestations in 1988. In the Golden Forest District cutworm larvae were found in a 42 ha block that was prescribed burned in 1985 and planted with shelter cones in 1986. The herbaceous growth showed light to moderate defoliation, however, the seedlings suffered heavy mortality from what is thought to be caused by black army cutworm feeding.

The adjacent blocks burned in 1986 and planted spring 1987 were checked for cutworm. None were found. Subsequent pheromone trapping showed high numbers of moths indicating possible infestations in these blocks in 1988.

- E. Morris, Nelson Forest Region, Nelson; and S. Moss, Golden Forest District, Golden.

Black Army Cutworm Impact in the Prince George Forest Region. Spruce seedlings defoliated by black army cutworm in 1984 were examined in 1984, 1985 and more recently in August 1987. In 1984, 71% of new buds had been damaged to various degrees by black army cutworm and the mean percent defoliation per seedling was 86%. By August 1987, damaged seedlings had a significantly smaller percent height growth (16%) compared to undamaged seedlings (80%). Most of this difference was due to leader mortality and/or top deformations.

Although many seedlings had recovered their form since 1985, 14.3% had twin leaders, 2.4% had multiple tops, and 4.8% had died. Re-inspection of seedlings in 1989 and thereafter will help determine growth form and recovery rates.

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

Peridroma saucia, Variegated Cutworm. This cutworm was reported infesting a cutblock near the east end of the north arm of Quesnel Lake in 1986. The cutworm was defoliating spruce seedlings immediately after they were planted.

Examination of the same area in 1987 disclosed no indication of any new defoliation and no cutworms, (larvae, pupae or adults) were noted.

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

Cone and Seed Insect Control in Seed Orchards. Red cedar cone midge eggs were found in more than 90% of the cones sampled in two red cedar seed orchards in the spring of 1987. This is the first time that this insect has been noted in such numbers. A trial was established to test the efficacy of Metasystox-R®, dimethoate and acephate against this pest. Results should be available this spring.

Metasystox-R was also tested as an alternative to dimethoate for controlling cone and seed insects on individual Douglas-fir trees known to be susceptible to chemical burn from dimethoate. So far the results look promising with little evidence of phytotoxicity. Data is still being collected to check on efficacy and effects on seed production.

- D. Summers, Silviculture Branch, Victoria.

Cone Rust Control. Ferbam WDG® is now registered against spruce cone rust in seed orchards. This new registration is a result of cooperative (federal-provincial) efficacy trials conducted at Skimikin Seed Orchards over the last few years.

- D. Summers, Silviculture Branch, Victoria.

Western Spruce Budworm Control in Seed Orchards. Ground-based sprays of B.t. or carbaryl reduced early damage to spruce cones when applied just prior to budburst against western spruce budworm at Skimikin in 1987. Carbaryl also reduced subsequent cone damage and defoliation significantly. An aerial application of B.t. provided by Kamloops Forest Region seems to have kept defoliation at a moderate level with seed orchard averages less than 33%. Damage to individual trees varied considerably. There was no unsprayed check block with which to measure the effects of the aerial spray, however, larval infestation rates were high following the spray.

- D. Summers, Silviculture Branch, Victoria.

Balsam Woolly Aphid Update. The finding last winter of the expansion of the known balsam woolly aphid infestation zone to West Thurlow Island (reported by R.L. Ferris, FIDS Pest Report, April 1987 & in P.M.P. Vol. VI, No. 1) has resulted in a misconception by some people. This new finding is not the result of renewed activity and expansion by the aphid; it is merely a recent detection of an old infestation. Aphid populations are, in fact, currently at low levels. All surveys and samples taken this year have found only low incidences of the insect; it has been difficult to even find it in known areas of infestation (pers. comm. R.L. Ferris, FIDS Ranger).

Recent ground and aerial surveys have not been able to positively identify additional previously undetected infestations. However, similarly appearing crown symptoms were detected at another location on West Thurlow Island and across Chancellor Channel from West Thurlow Island in the Wellbore Valley. Because old growth amabilis fir in coastal forest often have flattened decadent looking crowns, it is difficult to detect balsam woolly aphid infestations from the air until a significant amount of mortality starts to occur. It is also very difficult to detect from the ground unless one has a viewing point; you can't see the symptoms looking up through the crown. These facts combined with the huge areas involved, complex terrain, and difficult and expensive access make extensive surveys for balsam woolly aphid problematic. Therefore, at this time, it is not possible to accurately determine the true area of balsam woolly aphid infestation.

- D. Heppner, Vancouver Forest Region, Burnaby.

Effect of Fertilization on Zelleria haimbachi. About 4 ha of 12-15 year old lodgepole pine on the Eden Fire area, west of Salmon Arm, has been heavily infested by the needlesheath miner, Zelleria haimbachi. This, and other areas are scheduled for fertilization in the coming years. In order to assess how the tree and insect reacts to fertilization, 10 fixed-area plots in juvenile spaced areas have been established. Half of these plots received fertilization (urea sulphur mix at 432 kg/ha) and half were left as untreated checks. Data collected in each plot included height, dbh, tree vigor index, proportion of tree defoliated, proportion of new growth defoliated, terminal and lateral growth and foliar nutrient analysis. The intent of the study is to determine if damage is lessened due to increased nutrient availability to the tree and how the tree responds to both the insect and increased nutrients. These plots will be assessed annually.

- L. MacLauchlan, Kamloops Forest Region, Kamloops.

Pitch Moths in Lodgepole Pine (Pl) Regeneration. A site with 10-15 year old lodgepole pine regeneration was partially spaced in 1986 and the remainder is scheduled for 1987. In the unspaced half of the stand the pitch-twig moth, Petrova albicapitana, was present in low to moderate incidence in the laterals of the young Pl. However, following the spacing, attack was occurring at the base of the whorls and was partially girdling the stem of the lodgepole pine. Further investigations will be done to see if this is a factor of spacing.

- L. MacLauchlan, Kamloops Forest Region, Kamloops.

FOREST PATHOLOGY

Publication of Disease Survey Results. In addition to the usual internal and file reports, Pest Management staff and others are encouraged to consider publication of their disease survey results in the Canadian Plant Disease Survey.

This journal is aimed at reporting annual disease surveys of crop plants in Canada, including forest trees. Many of the recent surveys noted in PMP would be suitable. Interested contributors should consult a recent issue of the journal for instructions to authors or contact the undersigned for advice or assistance in preparing a report.

For more information please contact the undersigned at 387-8739.

- J. Muir, Protection Branch, Victoria.

Forest Resource Development Agreement, (FRDA) Projects, Nelson Forest District. Field work for four FRDA projects have been completed; the following information is given.

Project 1 - Howser Creek, Larch Dwarf Mistletoe Spacing Trial:

Permanent plots were established in spaced and nonspaced 35 year old western larch stands with two levels of dwarf mistletoe: none and light. One plot about 60 m from an infected larch vet appears to have an intensified infection dating back 20 years.

The spaced stands will be monitored to study the effects of spacing in dwarf mistletoe infected stands.

Project 2 - Halfway River, White Pine Pruning and Spacing Trial:

Preliminary evaluation shows that pruned and spaced, and pruned no spacing had the lowest infection levels. However, the spaced and pruning, and spaced no pruning showed the highest rate of increase in new cankers, both lethal and nonlethal.

Plans are being developed to add a prune and space and re prune treatment.

Project 3 - Whatshan White Pine Active Bark Reaction Reserve:

The field work is complete. Burning slash piles was deferred. Two more active bark resistance trees and a very promising "tolerance" were also found. All branch banding and fertilization, done to encourage cone production, has been completed.

The veteran white pine at the centre of all the bark reaction trees and their likely parent has been bagged and its cones collected. Seeds will be sent to Gerry Frank (USFS - White Pine Tree Improvement Program) for testing. Left-over seed will be outplanted nearby to monitor seedling resistance and growth. Seed will be collected in future years.

Project 4 - Armillaria - Regeneration Survey - Golden Timber Supply Area (TSA):

A technique was tried in which armillaria infections would be recorded during a normal regen type survey. Last year, preliminary work done by Larry Delong indicated that regen surveys would be as accurate and precise as a variety of line or strip type surveys. The only modification to survey procedure was to begin all measurements in plots at an infected or killed tree. This was to avoid having well spaced trees "fitted" around an infected spot.

Preliminary analysis indicates that:

- 1) the technique worked in that it did pick up small levels of infection;
- 2) of 16 cutblocks sampled, 60 percent of the blocks had armillaria induced mortality;
- 3) two blocks had a small amount of armillaria that was not picked up in the plots (4 trees in 32 ha and 1 tree in 44 ha were noted as having armillaria);
- 4) by inference from surrounding blocks, even 7 spots per hectare seems to indicate significant infection at 5-16 years of age.

Several blocks have timber all around them with various levels of infection. As infection of original blocks was not recorded, original infection estimates will have to be made by inference from surrounding timber.

These blocks may be useful in calibrating the USFS PROGNOSIS model for use in southeastern British Columbia.

- D. Norris, Nelson Forest Region, Nelson.

Pest Training of Spacing Crews. Six Jobtrac and Social Assistance Recipients' Program, (SARS) spacing crews in the Vanderhoof and Prince George West Forest Districts were given a field identification course of pathogens of lodgepole pine. A walk-through of areas spaced prior to this training indicated that the spacers were not aware of these pathogens, as many infected trees were left. After the training, the crews were able to recognize stem rusts and dwarf mistletoe and were eager to remove infected trees. Next year, a similar training course is planned for all lodgepole pine spacing crews in the Prince George Forest Region.

- M. Schulting, Prince George Forest Region, Prince George.

Root Disease Modelling. Two projects are underway to either develop or implement two root disease models. However it might take several years before the models are usable for operational purposes.

The US Forest Service recently developed a root disease model for armillaria root disease and laminated root rot in inland forests. A proposal by the contractor to demonstrate how the model might be applied for training purposes in B.C. is being circulated for review and comment. The model has been well documented, and currently runs in conjunction with PROGNOSIS.

The applicability of, and calibration of PROGNOSES to B.C. conditions need to be determined. The model could be run with other stand projection models if they were judged to be better suited to B.C. stands and sites.

The second project is a model being developed by Ken Mitchell, Research Branch, and Bill Bloomberg, Pacific Forestry Centre, for laminated root rot in coastal forests. Data are being collected to validate the model. It is likely that the model will be suitable only for evaluating general management strategies. On the other hand, the PROGNOSES model is set up for site-specific inventory or cruise data, and should facilitate evaluation of management regimes and pest control treatments for individual stands.

- J. Muir, Protection Branch, Victoria.

Armillaria and Stand Spacing Do Not Mix Well. A Forest Resource Development Agreement (FRDA), contract has been entered with Pathocon Consulting to establish a trial to investigate ensuing mortality of dry-belt Douglas-fir after spacing in a stand infected with armillaria root rot. The Merritt Forest District silviculture staff has been helpful in arranging a spacing crew to work the blocks that have been marked for treatment.

Riverside Forest Products of Lumby is considering the same type of demonstration/investigation in a transitional dry-belt/wet-belt stand.

- H. Merler, Kamloops Forest Region, Kamloops.

Industry Stumping Trial Golden District. Evans Products Ltd. of Golden used a Cat 235 backhoe (with a hydraulic thumb or jaw) to push over trees in an area badly infected with Armillaria obscura. The site is in Interior red cedar/western hemlock (subzone 2 association 1) ecological zone. There is an average of 654 stems per hectare, between 20-70 cm in diameter and up to 35 m tall.

The machine used its bucket to push trees over, and the jaw to shake the root system free of dirt. A hi-drive D5 will be used to skid the trees. On the basis of 7 ha felled in this manner the costs breakdown as:

Cost of 235 falling, root shaking, and stem alignment was \$1,849/ha.

Item	Comparison of Costs per Hectare	
	Convention Treatment	Pushover Logging
Falling	\$ 600/ha	\$1,849/ha
Trailing	125	0
Skidding (est.)	450	500
Burning	250	0
Planting	400	0
Total	<u>\$1,825/ha</u>	<u>\$2,349/ha</u>

The net cost of stumping was \$524/ha. If this site was burnt, it will need to be planted. The cost of conventional stumping by excavator and windrowing was \$1,400/ha.

Skidding has been completed on about one hectare. Approximately 50 percent mineral soil exposure resulted, with little evidence of soil compaction on the sandy/silty loam soil.

Skidding costs are expected to be higher than normal and complete results will be presented in the next Pest Management Progress report.

- D. Norris, Nelson Forest Region, Nelson.

Annosus Root Rot Survey. John Schulting has been awarded a Forest Resource Development Agreement Contract to assess the incidence of Fomes annosus root rot in juvenile spaced stands in the Kalum Forest District. Funds are being provided by the District. Approximately twenty stands will be surveyed and permanent sample plots will be established to study the behaviour of the disease over time. Results will be reported through the Px Trial system.

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

Dika Root Rake's Stirring Conquest of Phellinus. A transitional interior Douglas-fir stand infected with Phellinus weirii (see P.M.P. Nov. 1986, pg.28) in the Salmon Arm Forest District was the site of a stand rehabilitation trial. Three site treatments were performed after clearcut logging, rough bunching, rough bunching and stump removal with a seven-tine Beales blade and rough bunching stumping and root raking with a Dika drum root rake. The rake was pulled behind a skidder and windrowed smaller root material found up to 40 centimeters below the soil surface. Two replications of each treatment were done on the 12 hectare site.

Pedologists are quite excited about the superlative job the Dika did in lowering soil bulk densities and mixing organic material into the soils. Costs after rough bunching, although for a small area, were quite reasonable. It is planned to restock the site with several different species and of course Douglas-fir to render an indication of inoculum reduction effectiveness.

- H. Merler, Kamloops Forest Region, Kamloops.

Phellinus Stumping Trial: A Large Enterprise For Small Business. A seven hectare block, part of a recent Small Business sale, had it's silviculture system adjusted due to recognition of Phellinus weirii root rot. The north-west exposed very-dry interior Douglas-fir site, in the Kamloops Forest District, had a diameter limit shelterwood harvest changed to clearcut harvest. The site had been established as a trial to contrast stump removal with rough bunching. Each treatment was replicated six times on 0.66 hectared blocks. All site treatments were performed with a D-8K tractor. A four tine Beales blade was inefficient for stumping due to stumps (up to 50 cm DBH) slipping through the teeth. Ponderosa pine, lodgepole pine and Douglas-fir will be planted. The soils had a very high silt content however, compaction

has been totally avoided, in fact, bulk densities have been ameliorated, attributable in part to the very dry growing season.

- H. Merler, Kamloops Forest Region, Kamloops.

Root Rot Incidence in Coastal Douglas-fir Permanent Sample Plots. A cooperative study between MacMillan Bloedel and the B.C. Forest Service, Vancouver Forest Region, to investigate ecological disease hazard relationship of laminated root rot (Phellinus weirii) in coastal Douglas-fir ecosystems was run during the summer of 1987.

The sampling methods involved ecological descriptions and root rot incidence and severity estimates in and around 216 of MacMillan Bloedel's pure, natural, unmanaged Douglas-fir permanent sample plots (PSP's). Root rot sampling was restricted to no greater than 1.5 ha of the continuous ecosystem identified at the PSP's. Incidence of P. weirii in the PSP's was 33% and incidence in the surrounding ecosystems estimated at about 70%. Severity levels ranged up to 20%, percent basal area reduction (% BAR).

This study provided the first intensive use of the percent basal area reduction sampling method for root rot in B.C. A systematic grid of prism point samples were run with points and sweeps being estimated as healthy or infected. Infected points have reduced stand density and stocking, thus, a lower basal area. An algorithm for % BAR was developed using mean basal areas for each of healthy and infected point classes. The % BAR values intuitively appears correct with field experience and will be cross checked from the binomial (healthy/infected) area-infected response data.

The sampling method was very sensitive to the invasion of less-susceptible species into infected sweep point samples, as shown by higher numbers of less-susceptible species into infected sweep point samples, as shown by higher numbers of less-than 17.5 cm diameter limit cedar, hemlock and deciduous species.

Correlation of disease incidence and severity with ecosystems is incomplete. Field impressions are that P. weirii has a very high incidence but lower severity in the slightly dry to fresh red cedar/Douglas-fir and red cedar/western hemlock (subzone 1) ecosystems and less so in the drier and wetter ecosystems. The infection severity appears to be highest in the fresh to moist ecosystems but with lower incidence.

The study results will be available by the fall of 1988. Funding was made available from Forest Resource Development Agreement, Section 88, MacMillan Bloedel and the B.C. Ministry of Forests and Lands.

- J. Beale, Vancouver Forest Region, Burnaby; and J. Kumi, MacMillan Bloedel Limited, Nanaimo.

Use of Alternate Species for Phellinus Root Rot Control. The Vancouver Forest Region is establishing a monitoring matrix for a variety of pure and alternate species mixes used in the control of laminated root rot. Installation plot sizes are between 0.10 ha and 2.0 with confirmed, high Phellinus weirii inoculum loadings. Hemlock, cedar, white, lodgepole, and ponderosa pines, larch and cottonwood are to be considered for alternate species. Monitoring mortality will be the prime use of the plots, though growth and yield measurements may be a future use. This is a cooperative project with both industry and B.C. Forest Service involvement.

- J. Beale, Vancouver Forest Region, Burnaby.

Spread of Tomentosus Root Rot in Central British Columbia. This summer, a Forest Resource Development Agreement project was undertaken by K. Lewis to determine the spread of tomentosus root rot from infected stumps to regenerated trees. Observations were made on many sites and five sites were examined in detail. On these sites, whole stumps were excavated and the colonization pattern of Inonotus tomentosus mapped. Root contacts with surrounding regeneration were investigated. Two of the blocks studies were recently harvested (1985 and 1986), two were harvested ten to twelve years ago and one site had been selectively logged in the early 1960's. Stumps of spruce, pine and Abies were examined. From the inoculum collected, vegetative compatibility tests are being completed. This will determine the importance of basidiospores in the spread of tomentosus. As well, seedlings are currently being inoculated. A report on this work will be completed in March 1988.

- M. Schulting, Prince George Forest Region, Prince George.

Tomentosus Root Rot Update. A Forest Resource Development Agreement funded destumping trial took place in the Bulkley Forest District in mid September. A large excavator (Hitachi UH9-7) with a stationary thumb and a D8 crawler tractor with a brush blade were used to remove all spruce and pine stumps on two 4.5 hectare plots. Overall costs were \$795.00 and \$647.00 per hectare for the excavator and D8 crawler tractor, respectively. The sites are to be planted with spruce and the incidence of tomentosus on seedlings will be compared with a control.

The use of Gel caps (Pace Chemicals Ltd.) to inject into mature spruce trees to promote rapid decay of infected root systems failed. A 6 week post treatment examination revealed that none of 30 treated trees (15 ml per tree) had died. Little if any movement of the Roundup® herbicide in each gel cap had occurred either due to inadequate penetration into the phloem and/or resinous which was common on most gel caps. A draw knife was used to remove the outer bark prior to seating each gel cap in the smooth surface. Hack and squirt probably would have worked better in getting Roundup into the phloem and root system. The experiment will be converted into a species trial for resistance to tomentosus. The stand could not be treated again as it was scheduled for logging as a Small Business Sale this fall.

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

Joint Federal-Provincial Forestry Remote Sensing Study. The use of 70 mm colour photography to detect tomentosus root rot infected spruce in a 25 year old plantation at Jonas Creek has yet to be assessed. We have a limited number of photo pairs and plan to assess its utility as soon as possible.

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

Branch and Leader Dieback of Young Douglas-fir. The Cariboo Forest Region did not conduct any further specific surveys for Sclerophoma spp. However, Richard Riech, working on a Forest Resource Development Agreement grant and located at the headquarters of the Alex Fraser Research Forest, conducted surveys throughout the past summer. His preliminary report, to Dr. Bart Vandercamp of U.B.C., indicates late spring frosts to be the primary culprit for producing entrance courts for the Sclerophoma spp. spores.

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

Update: Douglas-fir Leader Dieback. Funded by a Forest Resource Development Agreement (FRDA) Contract, Dr. B.J. Van der Kamp and Richard Reich of University of British Columbia (U.B.C.) have been studying Douglas-fir leader dieback in the Cariboo and Prince George Forest Regions. Preliminary results indicate that frost damage predisposes Douglas-fir to attack by canker fungi. Sclerophoma has been found in the frost killed portions of the leader or branch and Cytospora where the canker has extended down the leader or branch and attacked living tissue. More work is being completed on the etiology of this disease and a final report to FRDA will be completed in March, 1988.

- M. Schulting, Prince George Forest Region, Prince George.

Acceptability Criteria for Utilization of Western Hemlock Regeneration. A Forest Resource Development Agreement contract has been entered with Pathocoon Consulting to investigate the value of western hemlock regeneration in the establishment of a new forest crop. The contract will consider interior wet-belt cedar/hemlock forests from Prince George, Kamloops and Nelson Forest Regions. Preliminary results of a decay incidence surveys of older hemlock stands will be ready by Christmas. The ultimate product will be acceptance criteria in the form of guidelines for hemlock regeneration use in specific ecosystems and its forecasted sound wood potential.

- H. Merler, Kamloops Forest Region, Kamloops.

Stem Cankers of Lodgepole Pine, A Master of Pest Management Thesis Defended. At Simon Fraser University, Mr. Ralph Nevill presented the results of his study in the Kamloops Forest District of lodgepole pine infected with atropellis canker and stalactiform blister rust. The thesis studied the effects of these pathogens on tree growth, lumber volume and the grade, value and strength of lodgepole pine lumber. Atropellis canker and stalactiform blister rust reduced the volume of infected trees by 7.9% and 6.2% respectively. Manufacture of these stems magnified the impacts. Respective volume losses of 28.7% and 26.4% resulted. The ratio of grades of lumber also changed, with atropellis infected logs producing 40% less standard and better

grade, and 80% more utility grade. This reduced the economic potential of the sites in question by \$508.40 per hectare. Atropellis was also shown to significantly reduce the modulus of elasticity.

The harvesting, milling and grading was graciously performed by Balco Industries of Heffley Creek, and the stress testing was performed by Forintek Canada Corporation.

- H. Merler, Kamloops Forest Region, Kamloops.

Canadian Forestry Service Provincial White Pine/Root Disease Trial. In the Lillooet Forest District, as well as in other Districts throughout the province, a western white pine provenance trial was established to investigate potential hereditary "resistance" to phellinus root disease.

- H. Merler, Kamloops Forest Region, Kamloops.

Lodgepole Pine Stem Rust Incidence in Spaced and Unspaced Stands. A study of the incidence of stem rusts in spaced and unspaced lodgepole pine stands has been initiated in the Prince George Forest Region. Through incidence surveys and the determination of age and height at spacing, we will initially be able to determine what the minimum density should be after spacing an infected stand. The establishment of permanent sample plots in rust infected areas will eventually result in site-specific guidelines for spacing densities based on pre-spacing infection levels and stand age and height. Work on this project will continue in 1988.

- M. Schulting, Prince George Forest Region, Prince George.

Kootenay Christmas Tree Growers Association. Several liaison visits and addresses to members were done in 1987. It appears that their "needle blight" problem is actually an armillaria problem which is now their dominant concern. Fertilizer projects and foliar analysis conducted by Ministry of Agriculture and Fisheries indicate that infected trees can be "brought back" to production and harvested. Once a Christmas tree is harvested the root system is lost.

Foliar analysis indicates extreme nutrient deficiencies of phosphate and boron in the soil. While the soils may appear to be moisture limiting, the various nutrient deficiencies induced by high pH may be the real problem.

- D. Norris, Nelson Forest Region, Nelson.

White Pine Pruning in the Vancouver Forest Region. Two further operational blister rust pruning trials were initiated in a Duncan Forest District plantation and a Sechelt Forest District natural stand in 1987.

A second assessment of three other Regional trials is showing a marked reduction (7, 63, and 93%) of stem cankering in the treatments. The incomplete reduction is still due to the fact that many stems had stem canker infections at the time of pruning. A five year assessment this winter (which is timed to allow for complete canker expression from 1982 infections) will

remove the confounding stem cankered trees from the sample and the true effects of pruning will be clearly seen in subsequent five year remeasurements. Interestingly, the higher reduction values are associated with pruning trees with a lower mean tree height and on flatter ground versus higher mean tree height and moderately steep slopes.

- J. Beale, Vancouver Forest Region, Burnaby.

Volume Loss in Dwarf Mistletoe Infected Lodgepole Pine. A Forest Resource Development Agreement contract is being prepared to determine individual tree volume loss due to lodgepole pine dwarf mistletoe. Volume loss will be determined by stem analysis. The methodology is being designed in conjunction with Al Thomson of Canadian Forestry Service. This contract will be tendered in December 1987 and the results from this study used to design a larger dwarf mistletoe volume loss study. The ultimate result is a volume loss due to dwarf mistletoe for the Prince George Timber Supply Area.

- M. Schulting, Prince George Forest Region, Prince George.

Pinewood Nematode Status. Restrictions to the importation of British Columbia softwood products proposed by the European and Mediterranean Plant Protection Organization were largely averted, as a result of an intensive trade mission to European and Scandinavian countries by federal government agencies. Hopefully, research results and continuing negotiations will alleviate the current restrictions on wood chip imports. The Council of Forest Industries of B.C. is continuing their liaison with counterparts in England and Europe to monitor the situation.

- J. Muir, Protection Branch, Victoria.

Evaluating the Effects of Ozone/Oxidant Air Pollutants on Forest Nursery Production. Increasing levels of air pollutants are being observed in the Lower Mainland - Lower Fraser River Valley area. The Vegetation Impact Sub-Committee serving the Lower Mainland Oxidant Steering Committee has recognized this problem and is particularly concerned with the effects of existing and potential impacts of ozone damage on agricultural, horticultural and forestry activities in the region. Ozone, a photochemically produced gas, often exceeds safe limits during prolonged hot, dry, sunny periods in the spring and summer. The effects on vegetation are of reduced respiration and yield, lower shoot to root ratios and possibly predisposition to frost damage.

Preliminary discussions are underway to investigate for existing and potential damage to forest nursery seedling production at the Surrey Forest Nursery in 1988/89. The nursery is located in a very high ozone zone. The study will look at the effects of clean air, ambient and elevated levels of ozone on the production of 1+0 container stock (probably clonal Douglas-fir, white spruce and cottonwood). Dose-response relationships will be estimated for yield, shoot: root ratio photosynthesis rates and forest hardiness. Outplant survival will also be monitored.

The cooperators are the Ministry of Forests and Lands, Silviculture Branch and Protection Branch; the Ministry of Environment and Parks, Waste Management Branch; Greater Vancouver Regional District; University of British Columbia and Simon Fraser University, with assistance from University of Washington.

For further information please contact the undersigned at 660-7654.

- J. Beale, Vancouver Forest Region, Burnaby.

FOREST VEGETATION MANAGEMENT

A New Ministry Pamphlet - "Managing Vegetation in Provincial Forests". A pamphlet on the topic of Vegetation Management has recently been published and is available from the Ministry Administration Supply Section (Technical & Administrative Services Branch). The items discussed include the need and options for managing vegetation, and factors to be considered when making a prescription. The publication is designed primarily for general public information.

For more information on this vegetation management pamphlet contact the undersigned at 387-8905.

- J. Boateng, Silviculture Branch, Victoria.

Decision Making Profile. The Ministry "Decision Making Profile for Vegetation Management Options" was revised and distributed to field staff for testing last summer. The changes include the addition of a section to identify potential problems, and measures which may be implemented to reduce the risk level. Comments on the Decision Making Profile will be reviewed this winter. Formal printing of the package is scheduled for next spring.

The profile is an integral part of the prescription process when used in conjunction with the Silviculture Survey and the Pre-Stand Tending Survey.

- G. Ackerman, Silviculture Branch, Victoria.

Salal Broom Control Trial (SX 86709 Q). In September, 1986, a small trial was established near Duncan to test the effect of the herbicide Roundup® (Vision®) applied with diesel fuel as a carrier on salal and broom. As a check, an area was treated with the same herbicide, but utilizing water as the carrier. A similar area was also established as an untreated control. The herbicide treatments were carried out using the CP 3 backpack sprayer.

The first assessment of this trial was conducted in mid September, 1987. Only minor control (less than 10%) of the target species was achieved with either diesel or water carrier. Considerable top dieback of established Douglas-fir seedlings was noted on areas treated with the diesel carrier.

The poor efficacy achieved on this trial may be attributed to season of application.

- G. Ackerman, Silviculture Branch, Victoria.

RANGE PEST MANAGEMENT

Update on the Biological Control of Dryland Noxious Weeds Program. The dryland noxious weeds biological control program made some notable advancements in 1987. A facility for propagating root mining agents which attack knapweeds was established, in conjunction with Selkirk College, at Castlegar. This facility consists of caged plots where knapweed is encouraged to grow at high densities and into which three newly available root mining agents were released. Next year the facility will be expanded and agents collected from the cages will be field released. This new facility supplements the Ministry of Forests and Lands' propagation facility already operating at the Agriculture Canada Research Station in Kamloops.

At present three seed head insects and one root mining beetle which attack knapweeds have been distributed in B.C. The root mining beetle, Sphenoptera jugoslavica, had some assistance in distribution this summer when ranchers from the southern interior were invited to a field day at the original release site near Penticton to collect beetles for release on their knapweed infested private lands. Over the next few years several additional agents from the propagation facilities at Castlegar and Kamloops should be ready for distribution. The prospects for effective biological control of knapweed looks encouraging.

A root mining agent, Agrilus hyperici, established on goatweed, or St. John's wort, Hypericum perforatum, in Idaho was collected and released on some problem stands of goatweed near Grand Forks. Generally goatweed is effectively controlled by agents released in the 1950s and 1960s, however, there are still some problem sites. The upper grasslands and Ponderosa Pine grassland interface at Gilpin has hundreds of acres of goatweed infestation. It is hoped that this new agent will fill the gap missed by other agents.

A nodding thistle infestation, Carduus nutans, discovered in 1981, in the Bridesville-Rock Creek area has been controlled with the establishment of two biological control agents. Survey of the infested sites this summer turned up a few scattered plants all of which were under attack by a seed head weevil, Rhinocyllus conicus. The weevil was released in 1984 and a second weevil, Trichosiromus horridus, was released in 1986.

For further information on the biological control program contact:
Rick Tucker, Kamloops Forest Region, 828-4096, Tom Lester, Integrated Resources Branch, Victoria 387-3213 or the undersigned at 354-6245.

- B. Drinkwater, Nelson Forest Region, Nelson.

Biological Control of Houndstongue. The Ministry of Forests and Lands has provided funding for the reconnaissance collection of European insects which might be used to combat houndstongue here in B.C. Scientists at the Commonwealth Institute for Biological Control in Delemont, Switzerland sampled areas of western Hungary collecting a number of species of moths and other insects which parasitize houndstongue, which is native to this area of Europe.

- T. Lester, Integrated Resources Branch, Range Management Section, Victoria.

PESTICIDES

Handbook of Facts on Forest Pesticides. "A Quick Guide to Pesticides, Use and Regulations in B.C. Forest Management" has been published and distributed to key staff members in all Forest Service Regional and District offices.

The preparation of this guide was based upon recommendations of the Forest Issues Steering Committee (FISC). It is designed to be used by field personnel who are involved in pesticide use operations and is intended to aid them in answering questions from the public on most aspects of forest pesticides, their use and regulation.

Some of the topics covered are pesticide legislation; B.C. Environmental Appeal Board procedures; relative use of pesticides in Canada and B.C.; forest management activities on Crown forest lands; vegetation management and forest productivity; pesticides vs. other methods - costs, advantages and disadvantages for control of some major forest weeds, and fact sheets on the major forest pesticides used in B.C.

Also included is an abbreviated Decision-Making Profile for Insect and Weed Control Operations, outlining the steps to be taken before a decision to use pesticides may or may not be made.

- P. Humphreys, Protection Branch, Victoria.

The Pesticide Information Centre. The Pesticide Information Centre is a collection of forestry related pesticide publications organized into seven binders. This Information Centre has been established in each Forest Region and District Office in order to provide factual information to forestry staff and the public. Any individual requesting information on pesticides may consult the Information Centre publications and then discuss any remaining questions with Ministry staff. Subjects covered in the Centre include: technical facts on forestry pesticides, human toxicology and environmental impacts. The contents of this Centre will be updated regularly by Branch staff.

For further information on the Information Centre contact the undersigned at 387-8738.

- J. Henigman, Protection Branch, Victoria.

The Pesticide Information Centre and the Forest Pesticide Handbook of B.C. are not the Same Publication. The new seven volume Information Centre is a collection of forestry related pesticide publications to provide background to both forestry staff and the public.

The seven volume Forest Pesticide Handbook of B.C. is a complete summary of how to use pesticides in B.C. forestry and is designed to assist managers and technicians.

For more information on either of these two publications please contact the undersigned at 387-8738.

- J. Henigman, Protection Branch, Victoria.

Forest Pesticide Applicator Courses. Forest Pesticide Applicator Courses are now provided by Sylva Management Services Ltd. (Mr. Barry Manfield, Williams Lake, 392-6899). Arrangements to take the course should be made directly with Mr. Manfield. The fees for the course involve registration \$120, course materials \$15 and examination fee (paid to the examiner, not Sylva). \$10.

The course content and timing is similar to past year's courses starting Monday at 1:00 p.m. and finishing Friday at noon. Numerous guest speakers continue to be brought in to cover course topics and hands on demonstrations of equipment are provided.

Courses scheduled for 1987/88 are as follows:

1988

January 18 - 22	Courtenay
January 25 - 29	Vancouver
February 8 - 12	Kamloops
February 15 - 19	Kelowna
February 29 - March 4	Prince George
March 7 - 11	Fort St. John
March 14 - 18	Smithers
March 21 - 25	Castlegar
April 11 - 15	Prince George

The locations of the courses will be determined in the near future.

Additional courses can be organized by contacting Mr. Manfield directly.

- J. Henigman, Protection Branch, Victoria.

Handbook for Pesticide Applicators and Dispensers: FORESTRY SUPPLEMENT. The Forestry Supplement for the Handbook for Pesticide Applicators and Dispensers has been updated and published by the Queen's Printer. This supplement has been used for three years in the Forest Pesticide Applicator Courses and is the result of the combined efforts of:

- Industrial Hygiene Department, Workers' Compensation Board of B.C.;
- Pesticide Control and Fisheries and Wildlife Branches, B.C. Ministry of Environment and Parks; and,
- Silviculture and Protection Branches, B.C. Ministry of Forests and Lands.

It can be purchased as part of a study kit for forest pesticide certification from Ministry of Environment and Parks Regional Offices or can be purchased from Queen's Printer Publications, 563 Superior Street, Victoria, B.C. V8V 4R6.

- S. Taylor, Protection Branch, Victoria.

Prince Rupert Forest Region Pesticide Project Manager Certification. The Prince Rupert Forest Region has a Draft Manual Insert which defines a "Certified Project Manager". To be a certified project manager for aerial pesticides (herbicide or insecticide) applications, one must successfully complete each part of a 5 part program (Pesticide Applicators Certificate, Office Review plus exam of the specific phases of an Operation, Helicopter and Fixed Wing Management, Restricted Radio Operators Licence and Apprentiseship). In the future certification for aerial fertilizer application will likely also be required.

Results of our most recent certification course (Nov. 2) are not yet available. However, we expect to have and maintain approximately 20 Project Managers throughout the Region.

- M. Geisler, Prince Rupert Forest Region, Smithers.

Garlon® 4E Herbicide Registration Update. In discussion with Mr. Tim MacKay of Dow Chemical he indicates that the company expects a full registration for industrial use for Garlon 4E in 1988. All the data required for this has been accepted by Agriculture Canada.

Dow Chemical have undertaken a 90 ha aerial spray research project with Garlon 4E at a dosage of 3.84 kg a.e., tricloypr, during August of this year in northern Ontario. This research study included an overspray of a stream and will generate chemical persistence and breakdown data needed for the forestry registration which is likely to be granted in 1990. In the near future we should receive copies of studies conducted by Dow Chemical both in northern Ontario and at the U.B.C. Research Forest. These research studies address persistence and breakdown in water, soil, litter and foliage and; impact to various organisms including plants, invertebrates and fish.

- J. Henigman, Protection Branch, Victoria.

Velpar Herbicide. Velpar® Herbicide efficacy and potential for soil movement has continued to be studied during this past field season. Information from every Velpar treatment project has been received concerning the soil movement issue. Efficacy data has also been extensively collected. In the near future a report will be published with this season's finding on soil movement. Although the details have not yet been studied, we know that there were no problems encountered with unexpected Velpar movement this year.

- J. Henigman, Protection Branch, Victoria.

Kelowna, Mission-Belgo Creeks area, Herbicide Program Court Case. In June, 1987, a court judgement was rendered on a dispute between the Canadian Earthcare Society and the B.C. Environmental Appeal Board. In this case Earthcare challenged the decision of the Appeal Board to allow the B.C. Forest Service, Penticton Forest District, to proceed with its planned herbicide treatment under Pesticide Use Permit #400-064-86/88. The original Appeal Board hearing occurred during November, 1986.

In the judgement the court concluded that the herbicide Roundup® (now Vision®) was acceptable for use as registered by the federal government; and the court also acknowledged that the rules of natural justice in the dispute had been followed. The court was critical, though unclear, about the lack of silvicultural justification required to validate the need for the herbicide treatment.

It has been interpreted by B.C. Forest Service staff that a more complete silvicultural justification for proposed herbicide treatments should be presented at Appeal Board hearings. The full implications of providing this information to the hearings remains to be seen.

- J. Henigman, Protection Branch, Victoria.

Krome Kote® Card Assessments from the 1987 Western Spruce Budworm Aerial Spray Applications. In May and June of 1987, an aerial insecticide spray was conducted using B.t. in the Kamloops Forest District. As part of this project Krome Kote® deposit cards were shipped to the Saskatchewan Research Council for:

- an accurate determination of droplet size and density;
- comments on spray deposit versus treatment efficacy; and,
- recommendations for improved sampling tools and techniques.

A final report should be complete by December.

- S. Taylor, Protection Branch, Victoria.

Law Reform Commission of Canada. A new publication has just been published entitled Pesticides in Canada: An Examination of Federal Law and Policy, (Catalogue #J32-3/39, ISBN 0-662-55413-2), by the Law Reform Commission of Canada. Copies may be ordered from the Law Reform Commission of Canada, 130 Albert Street, 7th Floor, Ottawa, Ontario, K1A 0L6.

- J. Henigman, Protection Branch, Victoria.

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

Protection Branch

R.F. (Bob) DeBoo	Manager, Pest Management	Victoria	387-8740
P.M. (Peter) Hall	Forest Entomologist	Victoria	387-8742
J.F. (John) Henigman	Pesticide Specialist	Victoria	387-8738
J.A. (John) Muir	Forest Pathologist	Victoria	387-8739
S.P. (Stuart) Taylor	Pest Management Technician	Victoria	387-8743
P.J. (Pat) Humphreys	Pest Management Technician	Victoria	387-8737

Silviculture Branch

M. (Mike) Wyeth	Silviculturist	Victoria	387-8922
J. (Jacob) Boateng	Brushing and Weeding Specialist	Victoria	387-8905
G. (Gord) Ackerman	Technician-Stand Tending	Victoria	387-8912
D. (Don) Summers	Seed Production Pest Management Officer	Victoria	387-3931
B. (Bev) McEntire	Seed Production Pest Management Technician	Victoria	387-8938
G.M. (Gwen) Shrimpton	Nursery Pest Management Officer	Surrey Nursery	576-9161

Cariboo Forest Region

Region Staff

D.F. (Don) Doidge (Vacant)	Pest Management Coordinator	Williams Lk.	398-4442
J. (Jane) Perry	Forest Entomologist	Williams Lk.	
S. (Sandy) Latins (vacant)	Stand Tending Forester	Williams Lk.	398-4400
	Range Weed Coordinator	Williams Lk.	398-4394
	Forest Pathologist	Williams Lk.	

District Staff

R. (Richard) McKay	Resource Officer - Protection	Chilcotin	394-4215
D.R. (Derek) Poole	District Pest Management Coord.	Horsefly	620-3327
D. (Dennis) Asher	Resource Officer - Protection	Quesnel	992-4383
J.R. (John) Bradley	District Pest Management Coord.	Williams Lk.	398-4655
R. (Robin) Fennel	District Pest Management Coord.	100 Mile House or (Clinton)	395-3812 459-2522

Kamloops Forest Region

Region Staff

R. (Ron) Edward	Pest Management Coordinator	Kamloops	828-4178
L. (Lorraine) MacLauchlin	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

Kamloops Region (District Staff) cont'd.

District Staff

J. (Jim) Jones	Resource Officer - Protection	Clearwater	674-2265
K. (Ken) Smith	Pest Management Technician	Kamloops	372-5832
J. (John) Flannigan	Pest Management Technician	Lillooet	256-7531
T. (Tom) Lacey	Resource Officer - Protection	Merritt	378-9311
H. (Harry) Spahan	Pest Management Technician	Merritt	378-9311
J. (Jim) Mottishaw	Pest Management Technician	Penticton	492-8721
W. (Wayne) Langlois	Pest Management Technician	Salmon Arm	832-7153
E. (Eric) Haupt	Pest Management Technician	Vernon	542-0264

Nelson Forest Region

Region Staff

E. (Ernie) Morris	Pest Management Specialist	Nelson	354-6144
D. (Don) Norris	Regional Forest Pathologist	Nelson	354-6143
J. (Jim) Sutherland	Stand Tending Forester	Nelson	354-6280
B. (Bob) Drinkwater	Range Coordinator	Nelson	354-6245

District Staff

D. (Dan) Reiben	Pest Management Officer	Arrow	365-2131
B. (Ben) Zuber	Pest Management Officer	Boundary	442-5411
S. (Steve) Byford	Pest Management Officer	Cranbrook	426-3391
L. (Larry) Hewlett	Resource Officer - Protection	Golden	344-7541
E. (Emile) Begin	Pest Management Officer	Invermere	342-4250
M. (Mike) Pascuzzo	Pest Management Officer	Kootenay Lk.	825-4415
A. (Archie) McConnachie	Resource Officer - Protection	Revelstoke	837-7611

Prince George Forest Region

Region Staff

R.D. (Russ) Cozens	Pest Management Coordinator	Pr. George	565-6119
R.S. (Bob) Hodgkinson	Forest Entomologist	Pr. George	565-6122
G.A. (Gord) Ensworth	Surveys and Detection Forester	Pr. George	565-6661
G.B. (Bruce) Pamplin	Stand Tending Forester	Pr. George	565-6179
M.J. (Maureen) Schulting	Forest Pathologist	Pr. George	565-6123

District Staff

P. (Paul) Gevatkoff	Resource Officer - Protection	Dawson Cr.	784-2350
R.E. (Roy) Simpson	Resource Officer - Protection	Ft. Nelson	774-3936
G.H. (Gerry) Vanderkwaak	Resource Assistant - Protection	Ft. Nelson	774-3936
J.A. (John) Reid	Resource Officer - Protection	Ft. St. James	996-7131
M.J. (Martin) Elphee	Resource Assistant - Protection	Ft. St. James	996-7131
W.O. (Walter) Johnston	Resource Officer - Protection	Ft. St. John	785-8177
A.R. (Al) Kneeland	Resource Officer - Protection	Mackenzie	997-3310
J.B. (Brian) Kempf	Resource Assistant - Protection	Mackenzie	997-3310
R.G. (Roger) Wiltzie	Resource Officer-Protection	McBride	569-2265
A.D. (Dale) Cinnamon	Resource Assistant - Protection	McBride	569-2265
G.E. (Gerry) Magee	Resource Officer - Protection	Pr. George East	562-4121
L.M. (Larry) Johnson	Resource Assistant - Protection	Pr. George East	562-4121
F.L. (Fred) Turner	Resource Officer - Protection	Pr. George West	564-6634
B.L. (Bruce) Doerksen	Resource Assistant - Protection	Pr. George West	565-6281
D.N. (Neil) Robertson	Operations Superintendent	Vanderhoof	567-9281
M.F. (Mike) Dittaro	Acting Resource Officer - Prot.	Vanderhoof	567-9281

Prince Rupert Forest Region

Region Staff

A. (Al) Gorley	Protection Officer	Smithers	847-7475
M. (Mike) Geisler	Pest Management Forester	Smithers	847-7477
T. (Tim) Ebata	Forest Entomologist	Smithers	847-7479
W. (Wayne) Martin	Forest Pathologist	Smithers	847-7478
F. (Fred) Newhouse	Stand Tending Forester	Smithers	847-7514
D. (Don) Russell	Range Officer	Smithers	847-7443

District Staff

W. (Bill) Jensen	Resource Officer - Protection	Bulkley	847-7555
K. (Ken) Bush	Resource Assistant - Protection	Bulkley	847-7555
		or	847-7629
S. (Sam) Campese	Resource Officer - Protection	Cassiar	771-4211
J. (Joe) Katasonoff	Resource Officer - Protection	Kalum	638-3302
K. (Kas) Kopec	Resource Assistant - Protection	Kalum	638-3290
N.J.L. (Nils) Andersson	Resource Officer - Protection	Kispiox	842-6581
B. (Bruce) Young	Resource Assistant - Protection	Kispiox	842-6581
W.F. (Bill) Davidson	Resource Officer - Protection	Lakes	692-2223
R. (Robert) Krause	Protection Resource Technician	Lakes	692-2222
B. (Bruce) Hutchinson	Resource Officer - Protection	Morice	845-6288
D. (Dave) Nakashoji	Resource Assistant - Protection	Morice	845-7712
W.T.S. (Bill) Jackson	Resource Officer - Protection	North Coast	627-0457
C. (Craig) Salter	Resource Assistant - Protection	North Coast	627-0472

Vancouver Forest Region

Region Staff

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

District Staff

T. (Terry) Preston	Resource Officer - Protection	Campbell River	286-3282
R. (Rob) Uttaro	Resource Assistant - Protection	Campbell River	286-3282
D. (Dave) Hames	Resource Officer - Protection	Chilliwack	794-3361
R. (Richard) Saunders	Resource Assistant - Protection	Chilliwack	794-3361
K. (Kerry) Grozier	Resource Officer - Protection	Duncan	746-5123
P. (Pat) Hayes	Resource Assistant - Protection	Duncan	746-5123
J. (Jack) Kouwenhoven	Resource Officer - Protection	Maple Ridge	465-7161
D. (Denis) Tippie	Resource Officer - Protection	Mid-Coast	982-2621
D. (Dan) Powell	Resource Officer - Protection	Port Alberni	724-9205
A. (Al) Cottoni	Resource Assistant - Protection	Port Alberni	724-9205
C. (Clarence) Friesen	Resource Officer - Protection	Port McNeill	956-4416
C. (Cam) Brady	Resource Assistant - Protection	Port McNeill	956-4416
B. (Barry) Miller	Resource Officer - Protection	Powell River	485-9831
R. (Ron) Diprose	Resource Assistant - Protection	Powell River	485-9831
B. (Brian) Simpson	Resource Officer - Protection	Queen Charlotte Island	559-8447
G. (Greg) Hemphill	Resource Officer - Protection	Sechelt	885-5174
J. (Jeff) Fournier	Resource Assistant - Protection	Sechelt	885-5174
K. (Keith) Davis	Resource Officer - Protection	Squamish	898-9671

MEETINGS

ACAFA Symposium on Aerial Application of Pesticides. The National Research Council's Associate Committee on Agricultural and Forestry Aviation (ACAFA) sponsored a three day symposium at Ottawa, October 20-22. The focus for this event was the discussion of chemical and physical factors affecting dispersal of small droplets (ca. 10-50 micron range) of chemical insecticides to control eastern spruce budworm. Of particular interest were presentations on weather influences, larval feeding habits, and aircraft vortices.

A comprehensive proceedings will be published in 1988 following presentation of highlights and recommendations to NRC.

Another symposium is planned for Winnipeg in 1989 where research needs will be presented by the aviation industry (and other users) on applications in aerial distribution (i.e. herbicides, seeding, fertilizers), photography, and fire management.

Please contact the undersigned for additional details concerning either event at 387-8740.

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

Ministry-Industry Field Trip. In cooperation with Evans Products, a multi-Forest District (Arrow, Revelstoke, and Golden) and Industry (Westar and Evans) field trip was conducted to demonstrate the impact of selective logging lodgepole pine (Pl), for mountain pine beetle control in Douglas-fir (F)/lodgepole (FPl) stands with Armillaria obscura infection. An FPL stand was selectively logged to remove all merchantable Pl, and dead, dying, and "sick" looking F. Three years later armillaria killed and severely infected trees amounted to 80-100 trees per hectare of the 500-600 stems per hectare that were left. Yet, at first glance, the treatment and stand response looks good.

- D. Norris, Nelson Forest Region, Nelson.

Western Forest Insect Work Conference. The 1988 work conference is planned for the first week of March in Flagstaff, Arizona. This meeting is attended by forest managers and entomologists from Canadian and U.S. federal, provincial, and state agencies and from Canadian and U.S. universities. Workshops and symposia conducted at this meeting cover a wide spectrum of forest-insect management related topics and offer a good opportunity to discuss state of the art practices and approaches.

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

Gypsy Moth Committee. The Gypsy Moth Committee of the Plant Protection Advisory Council is an interagency group which coordinates provincial gypsy moth activities. Membership includes representatives from Agriculture Canada, B.C. Ministry of Forests and Lands, Canadian Forestry Service, and the B.C. Ministry of Agriculture and Fisheries. Occasional cooperators include

representatives of the Department of National Defense, municipalities, and other agencies. The committee coordinates the pheromone-trapping and eradication programs, develops public information material, and serves as a general clearing house for information and agency policies regarding the gypsy moth. The most recent meeting was held in Kelowna on November 10, where spray plans were proposed for the 1988 eradication program.

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

Monitoring Root Diseases. A workshop, sponsored by the US Forest Service at Coeur d'Alene, Idaho, was held October, 1987 to review procedures and installations for monitoring root diseases and their effects.

A variety of plots and objectives were reported. D. Morrison, Pacific Forestry Centre, will develop a standard form so that the various plots can be catalogued.

Due to the wide variety of objectives - both research and operational - there was no standardized sampling design and plot layout recommended, nor accepted.

However, the proposed B.C. pest management design for root disease control trials was endorsed. The proposed procedures have to be modified in view of the newly proposed procedures for growth and yield permanent sample plots in B.C. Protection Branch staff have reviewed these draft procedures, and made several suggestions to improve the incorporation of data on pest effects.

- J. Muir, Protection Branch, Victoria.

Western International Forest Disease Work Conference. The 35th WIFDWC annual meeting at Nanaimo in August attracted 90 registrants - mostly forest pathologists - from the Pacific Northwest Region. A variety of topics were covered including recent research results and operational programs.

Personnel from the Ministry, MacMillan Bloedel, Canadian Forestry Service, US Forest Service, and Washington State Department of Natural Resources played key roles in organizing and conducting the sessions.

The 1988 workshop will be held at Ogden, Utah, and 1989 at Bend, Oregon in conjunction with the Western International Insect Disease Work Conference.

For more information contact the undersigned at 387-8739.

- J. Muir, Protection Branch, Victoria.

British Columbia

adhoc committee on forest pesticides

1987

TERMS OF REFERENCE

The purpose of the Committee is:

to provide an informal forum for members to discuss problems, make recommendations and suggest solutions to forest pesticide issues and to allow members to exchange information on forest pesticide use and regulations. The principles of integrated pest management are endorsed including, where there is no economic and practical alternative, the essential, responsible and judicious use of pesticides.

Members

- | | |
|--------------------------------------|--|
| . B.C. Wildlife Federation | . Council of Forest Industries of B.C. |
| . Assoc. B.C. Professional Foresters | . Canadian Forestry Service |
| . Canadian Pulp and Paper Assoc. | . Fisheries and Oceans Canada |
| . B.C. Forest Service | . International Woodworkers of America |
| . Pesticide Control Branch, MoE&P | . Fisheries Branch, MoE&P |
| . B.C. Ministry of Health | . Wildlife Branch, MoE&P |

For more information, please contact the Secretary

Mr. John Henigman
Protection Branch
B.C. Ministry of Forests and Lands
2nd Floor, 31 Bastion Square
Victoria, B.C. V8W 3E7

BRITISH COLUMBIA PLANT PROTECTION ADVISORY COUNCIL

1987

A. ORGANIZATION

The Council is composed of an Executive Committee headed by a Chairman elected by a majority vote of the Council at any one of two annual meetings. The actions of the Executive Committee are either authorized or ratified at a later date by the Council. Chairmen, appointed by the Chairman of the Council, appoint experts to serve on the committees. The power of a committee to act comes from the mandates of the agencies whose members sit on the committees. In situations where those mandates are insufficient to act, the committee may recommend to the Executive Committee that a formal approach on behalf of the Council be made to an appropriate agency for assistance. All recommendations of committees are sent to the Chairman of the Council.

B. TERMS OF REFERENCE AND DUTIES

1. To assess actual or potential hazards to British Columbia agriculture and forestry from insects, plant diseases, weeds, or other biotic agents by providing the broadest provincial forum for discussion of such issues.
2. To advise and coordinate the actions of provincial, federal, and other agencies when new or recurring pests appear. When remedial procedures taken by any agency are deemed inadequate, or result in unforeseen problems, to notify the agency concerned.
3. To advise and counsel provincial and federal officials in the preparation of news releases, legislation, or policies on pests in British Columbia. The release of recommendations to the public is at the discretion of member agencies.
4. To establish contingency procedures for new pests that may become established in British Columbia.
5. To appoint committee Chairmen as needed to investigate potential, new, or recurring pests.
6. To assess and advise on proposals to introduce biological or other control agents.
7. To review import and export of plant materials, and provide advice on restrictions to ensure that only high quality pest free stock shall be transported.
8. To respond to requests from member agencies or industries for recommendations that may not be publicly released.
9. To hold two Council meetings per year, announced by mail at least one month prior to meeting.
10. To elect a Chairman from member agencies who will hold office for a two year period. The Chairman will also serve as Chairman of the Executive Committee. The Chairman will appoint a Secretary and Chairmen of committees as are needed.

(- 2 -)

C. PARTICIPANTS

Agriculture Canada	B.C. Vegetable Marketing Commission
- Research Branch	Canadian Forestry Service
- Food Production & Inspection Branch	- Forest Insect & Disease Survey
B.C. Blueberry Growers Cooperative	- Research Program
B.C. Grape Growers Association	Council of Forest Industries of B.C.
B.C. Ministry of Agriculture and Fisheries	Simon Fraser University
- Crop Protection Branch	- Dept. of Biological Sciences
- Field and Special Crops Branch	- Centre for Pest Management
B.C. Ministry of Environment and Parks	University of British Columbia
B.C. Ministry of Forests and Lands	- Faculty of Forestry
- Protection Branch	- Faculty of Agricultural Sciences
- Field and Nursery Operations	- Faculty of Science
B.C. Nursery Trades Association	University of Victoria
	- Biology Department

D. VOTING MEMBERS

The following agencies are entitled to appoint voting representatives:

B.C. Ministry of Agriculture and Fisheries	Canadian Forestry Service (2 votes)
- Crop Protection Branch (1 vote)	Agriculture Canada
- Field and Special Crops Branch (1 vote)	- Research Branch (1 vote)
B.C. Ministry of Forests and Lands (2 votes)	- Food Production and Inspection Branch (1 vote)
	Members at Large*

(*Voting assigned by Chairman with respect to subject matter and knowledge)

E. EXECUTIVE COMMITTEE

Mr. Al Oliver, Chairman Agriculture Inspection Directorate Agriculture Canada #315 80-6th Street New Westminster, B.C. V3L 5B3	Dr. Bryan Frazer Agriculture Canada Research Station 6660 N.W. Marine Drive Vancouver, B.C. V6T 1X2
Dr. Gordon Miller Pacific Forestry Centre Canadian Forestry Service 506 West Burnside Road Victoria, B.C. V8Z 1M5	Dr. Bob DeBoo Protection Branch Ministry of Forests and Lands 2nd Floor, 31 Bastion Square Victoria, B.C. V8W 3E7
Mr. Tony Kluge Crop Protection Branch Ministry of Agriculture and Fisheries 808 Douglas Street Victoria, B.C. V8W 2Z7	Mr. Gordon Powell Plant Health Agriculture Canada #315 80-6th Street New Westminster, B.C. V3L 5B3

F. MAILING ADDRESS

Please address all correspondence to:
Mr. Tony Kluge, Secretary, BC PPAC (at address above)

**FORESTRY ISSUES STEERING COMMITTEE
BRITISH COLUMBIA FOREST SERVICE
MINISTRY OF FORESTS AND LANDS**

TERMS OF REFERENCE (1987)

The Forestry Issues Steering Committee is a special committee of senior Forest Service staff, reporting to the Forestry Division Directors.

Purpose:

To assist and advise Ministry Executive and Ministry staff in dealing with the management issue of pesticide use on forest and range lands.

Goals:

1. To evaluate the needs of Ministry staff with regard to public information and pesticide use.
2. To prepare an information base regarding pesticide use for internal Ministry use and for public awareness and education.
3. To facilitate the training of Ministry staff in public consultation on pesticide use and in media relations.
4. To liaise with other agencies, interest groups, and the forest and livestock industries in developing public information materials and programs on pesticide use.

5. To complete, implement, promote, and evaluate projects initiated by the committee.
6. To prepare annual committee budgets and plans for approval of the Forestry Decision Directors.
7. To examine other forest management issues as required by the Forestry Division Directors.

The Forestry Issues Steering Committee is chaired by the Assistant Chief Forester or an appointee of the Forestry Division Directors.

Representation on the committee is determined by the Chairperson in consultation with the committee.

Upon completion, products prepared under the direction of the Forestry Issues Steering Committee are directed to appropriate Branches for implementation, monitoring, and maintenance.

For more information contact:

Chairman, Forestry Issues Steering Committee
Integrated Resources Branch
1450 Government Street, Victoria, B.C., V8W 3E7
Phone: 387 - 3900

MEMBERSHIP (1987)

Chairman: Assistant Chief Forester

- Forestry Manager, Prince George Region
- Forestry Manager, Vancouver Region
- Director, Public Affairs Branch
- Silviculturist, Silviculture Branch
- Forest Pest Manager, Protection Branch
- Range Manager, Integrated Resources Branch
- Public Involvement Specialist, Integrated Resources Branch
- District Manager
- Recording Secretary

ACTIVITY FOCUS

Communication
People to People

+

Factual Information

+

Demonstration Problems, Solutions

= Understanding, Trust, Support

PROJECT SUMMARY

PROJECT	STATUS	DISTRIBUTION	CONTACT
1) Guidelines for Informing the Public About Proposed Herbicide Projects	Working Draft Completed February 1987	All Regions/Branches/Districts	Silviculture Branch
2) Guidelines for Planning National Forest Week Activities	Completed March, 1987	All Regions/Branches/Districts	Public Affairs Branch
3) Guidelines for a District Public Awareness Program	Completed February, 1987	All Regions/Branches/Districts	Pest Management Protection Branch
4) Pesticide Information Centers (7 Volumes)	Completed April, 1987	All Regions/Branches/Districts	Pest Management Protection Branch
5) Internal Attitude Survey	Completed Fall, 1986	Executive	Integrated Resources Branch/ Public Affairs Branch
News Release/Survey Results	Pending		
6) Pocket Reference Guide to Pesticides	Target Date: Fall, 1987	Not Distributed Target: MOFL Field Staff	Pest Management Protection Branch
7) Videos 1)Vegetation Management 2)Use of Herbicides	Target Date: Fall, 1987	Not Distributed Target: MOFL Field Staff/ Public	Silviculture Branch
8) Pesticide Questions and Answers	Target Date: Fall, 1987	Not Distributed Target: MOFL Field Staff/ Public	Silviculture Branch
9) Selection and Development of Guidelines for Forestry Demonstration Sites/Forests	Target Date: Fall, 1987	Not Distributed Target: MOFL Field Staff	Integrated Resources Branch/Public Affairs Branch
10) Demonstration Sites/Forests Inventory/ Criteria/Standards Rating	Target Date: Spring, 1988	Not Distributed Target: MOFL Field Staff	Integrated Resources Branch/Public Affairs Branch
11) Demonstration Site Pilot Project	Spring, 1988	Not Distributed Target: MOFL Field Staff/ Public	Integrated Resources Branch/Public Affairs Branch
12) Media Relations/Communications Training	Completed: Spring, 1987 Scheduled for Repeat Fall, 1988	Not Distributed Target: MOFL Field Staff	Public Affairs Branch
13) Herbicides and Forest Management in B.C. Fact Sheet	Target Date: Summer, 1987	Not Distributed Target: Public	Silviculture

FOREST PEST REVIEW COMMITTEE of BRITISH COLUMBIA

TERMS OF REFERENCE

Members

(Chairman: Chief Forester, B.C. Forest Service)

- | | |
|--|--|
| . Agriculture Canada (Plant Health) | . Council of Forest Industries of B.C. |
| . Ministry of Forests and Lands | . Environment Canada |
| . B.C. Ministry of Health | . (Environmental Protection Service) |
| . Parks Branch (MoEP) | . Recreational Fisheries Branch (MoEP) |
| . B.C. Technical Colleges | . Interior Lumber Manufacturer's Assoc. |
| . B.C. Universities | . Northern Interior Lumber Sector (COFI) |
| . Canadian Forestry Service | . Pesticide Control Branch (MoEP) |
| . Cariboo Lumber Manufacturer's Assoc. | . Water Management Br. (MoEP) |
| | . Wildlife Branch (MoEP) |

Introduction

Insects, diseases, vertebrates, and vegetation are natural components of a forest ecosystem. Under certain conditions, some species become pests and can significantly alter a forest cover, thereby changing its value to society.

The intensity of pest activity varies from endemic non-pest levels to large scale infestations with potential impacts that could be catastrophic for specific forest management objectives.

It is necessary that those engaged in forest land management keep informed of the current status of pest activity and damage. Furthermore, it is necessary that policies related to the management of insects, diseases and vegetation on forested lands be examined from a multiple use viewpoint and that resultant practices be a reflection of this viewpoint.

Accordingly, in the interests of keeping informed of current pest activity levels, a "Forest Pest Review Committee" was formed in November of 1974. Under the chairmanship of the Chief Forester of British Columbia, the Committee objectives are:

1. To keep informed of the current forest pest situation and management programs through annual meetings as required.
2. To provide a forum for members to discuss and make recommendations to resource managers on pest management program proposals for a multiple use viewpoint.
3. To have Committee members disseminate pertinent forest pest information to their respective organizations.
4. To forward comments and/or recommendations to other organizations where the Committee deems it advisable.
5. To encourage the formation or activation of regional pest review committees to institute programs where forest pest management problems warrant such action.
6. To inform the general public of the role, responsibilities and activities of the forest Pest Review Committee and to assist in the dissemination of pertinent information on forest pest management problems.

PESTICIDE CONTROL COMMITTEE
PROVINCE OF BRITISH COLUMBIA
(Draft Nov. 17, 1987)

PURPOSE:

The Pesticide Control Committee reviews Pesticide Use Permit applications and provides expert advice to the the Administrator of the Pesticide Control Act on the granting of permits on or other matters of concern to the Administrator.

Appointment:

The Minister of Environment and Parks appoints Committee members for a stated term. The Committee chairman is the Administrator and Director of the Pesticide Control Branch (MOE&P). Members are specifically chosen from the B.C. Ministries responsible for the administration of agriculture, environment, forests and health. Other members are chosen as the Minister considers appropriate.

Membership, (1987):

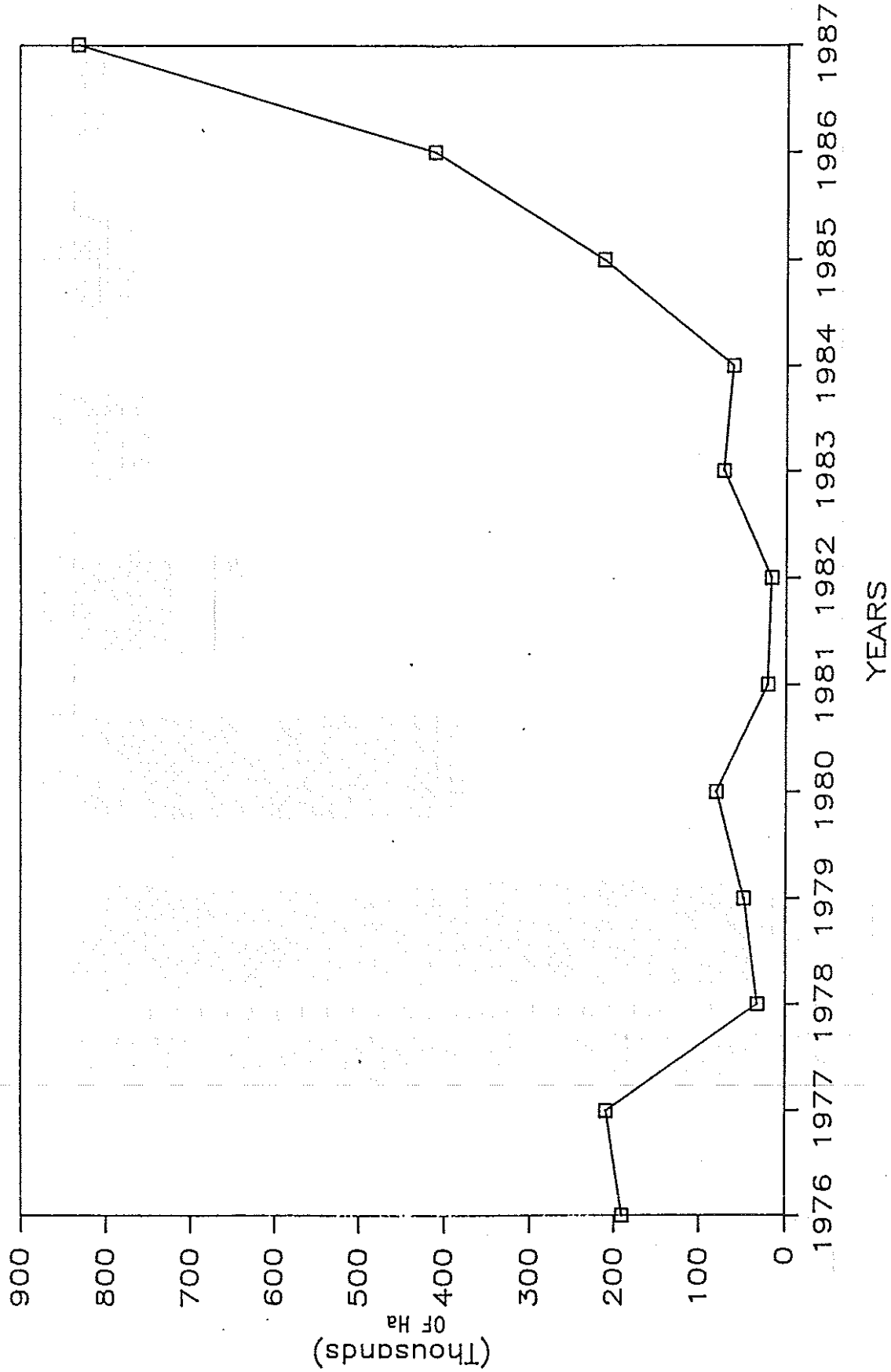
Chairman -	Dr. Ron Kobylnyk,	Ministry of Environment and Parks.
Members --	Mr. Roy Cranston,	Ministry of Agriculture and Fisheries
	Mr. John Henigman,	Ministry of Forests and Lands
	Mr. R. H. Kussat,	Federal Department of Environment, Environmental Protection Service
	Dr. J. H. Smith,	Ministry of Health
	Ms. Sylvia von Shuckmann,	Ministry of Environment and Parks Fisheries and Wildlife Branches
	Dr. Pat Warrington,	Ministry of Environment and Parks Water Management Branch

FUNCTION:

With limited exception, all pesticide use permit applications are reviewed by all Committee members and their comments and advice submitted to the Administrator, for consideration. The Administrator has full authority in granting and specifying conditions of Permits.

The review of Permit applications is regularly conducted through mail referral. The Committee normally meets twice a year to discuss issues of interest. From time to time, the Administrator consults members in order to set standards for pesticide use which are usually published as guidelines for pesticide permit applicants or incorporated as proposed changes to the Pesticide Control Act Regulations.

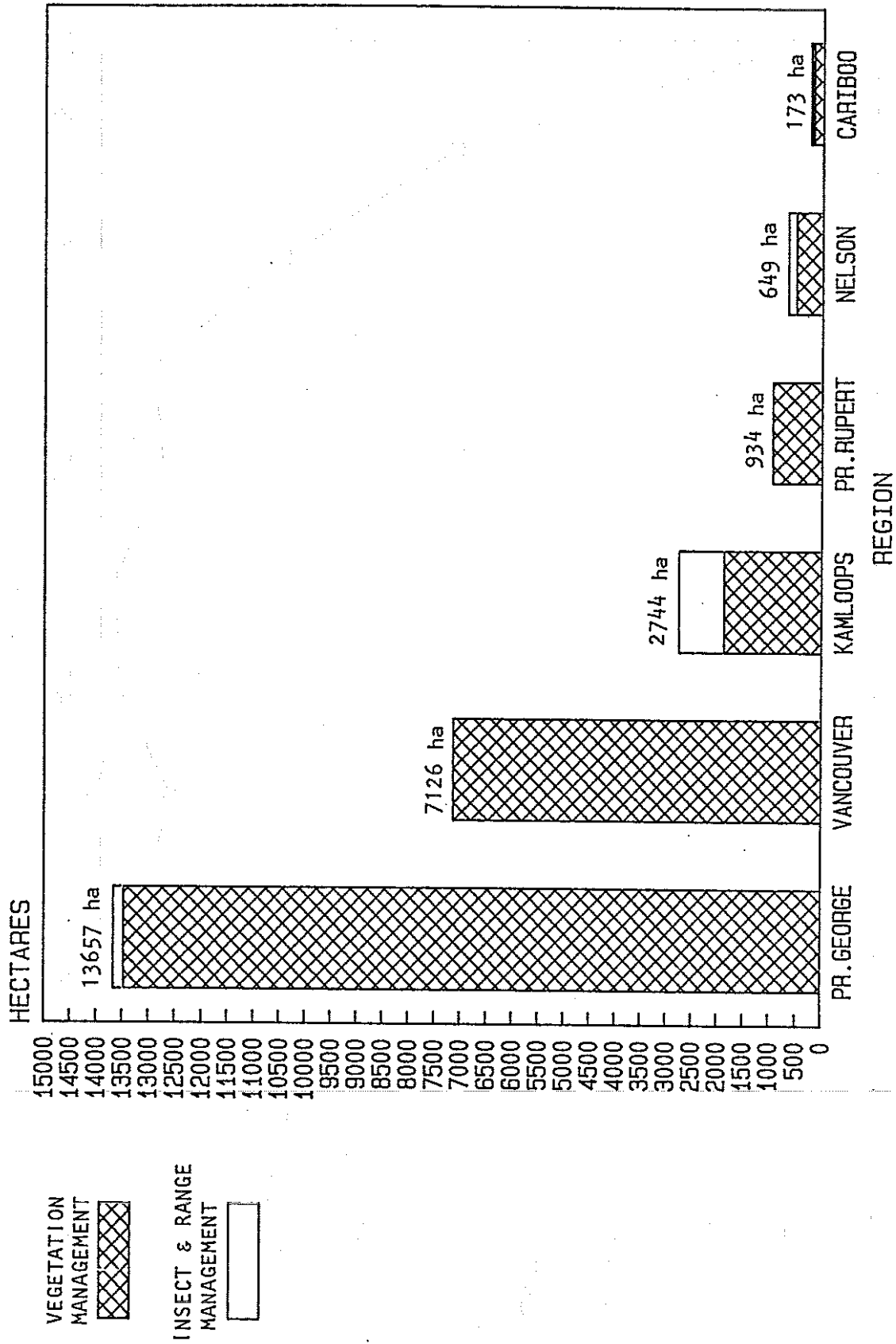
TRENDS IN VISIBLE DEFOLIATION OF DOUGLAS-FIR
CAUSED BY THE WESTERN SPRUCE BUDWORM IN
BRITISH COLUMBIA (YEARS 1976-1987)



Source: CFS (FIDS)

Prepared by P. Humphreys, Protection Branch, Victoria

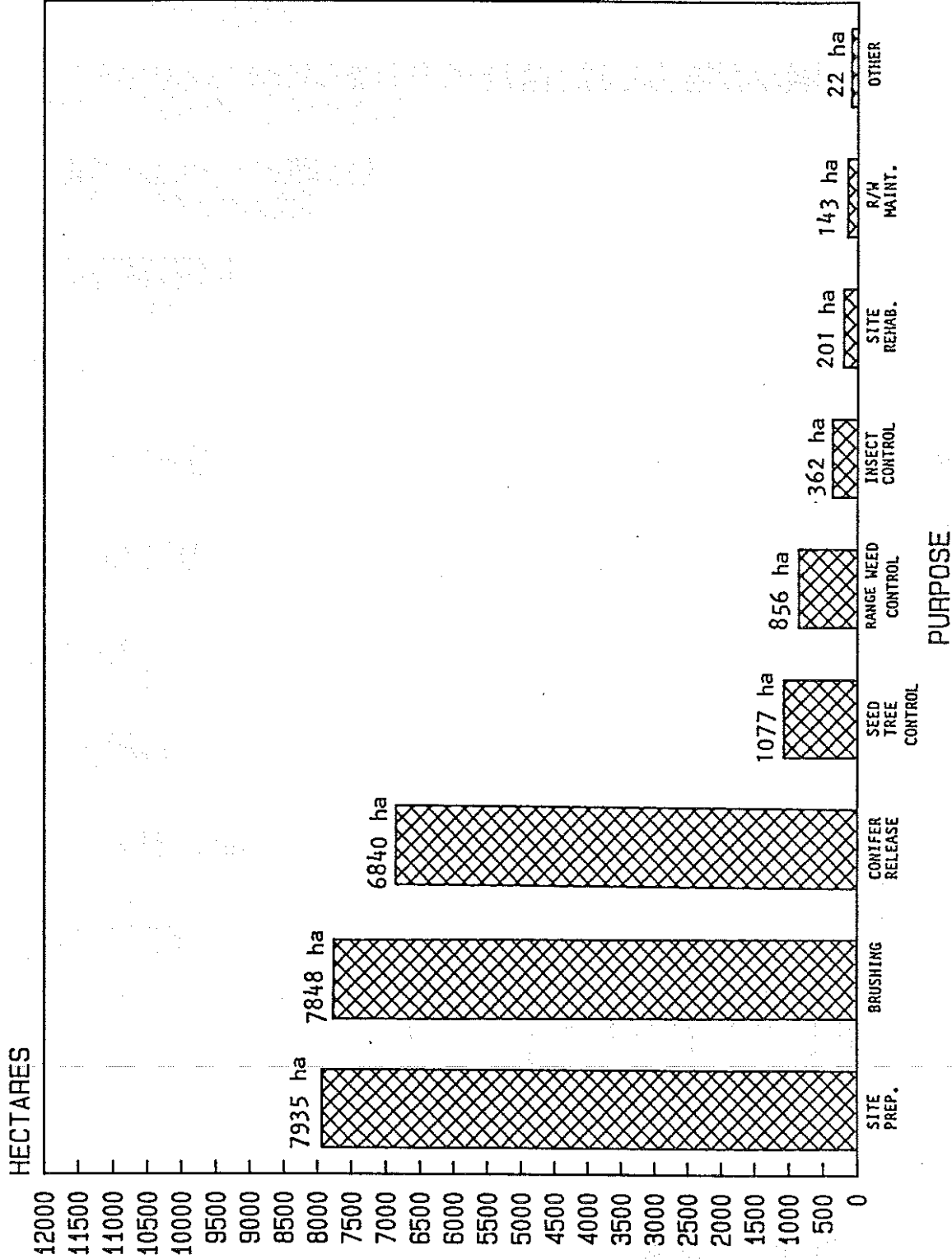
PROVINCIAL SUMMARY OF AREA (ha) TREATED WITH PESTICIDES
BY FOREST REGION, 1986¹



¹ B.C. FOREST SERVICE & B.C. FOREST INDUSTRY COMBINED.

PROVINCIAL SUMMARY OF AREA (ha) TREATED WITH PESTICIDES

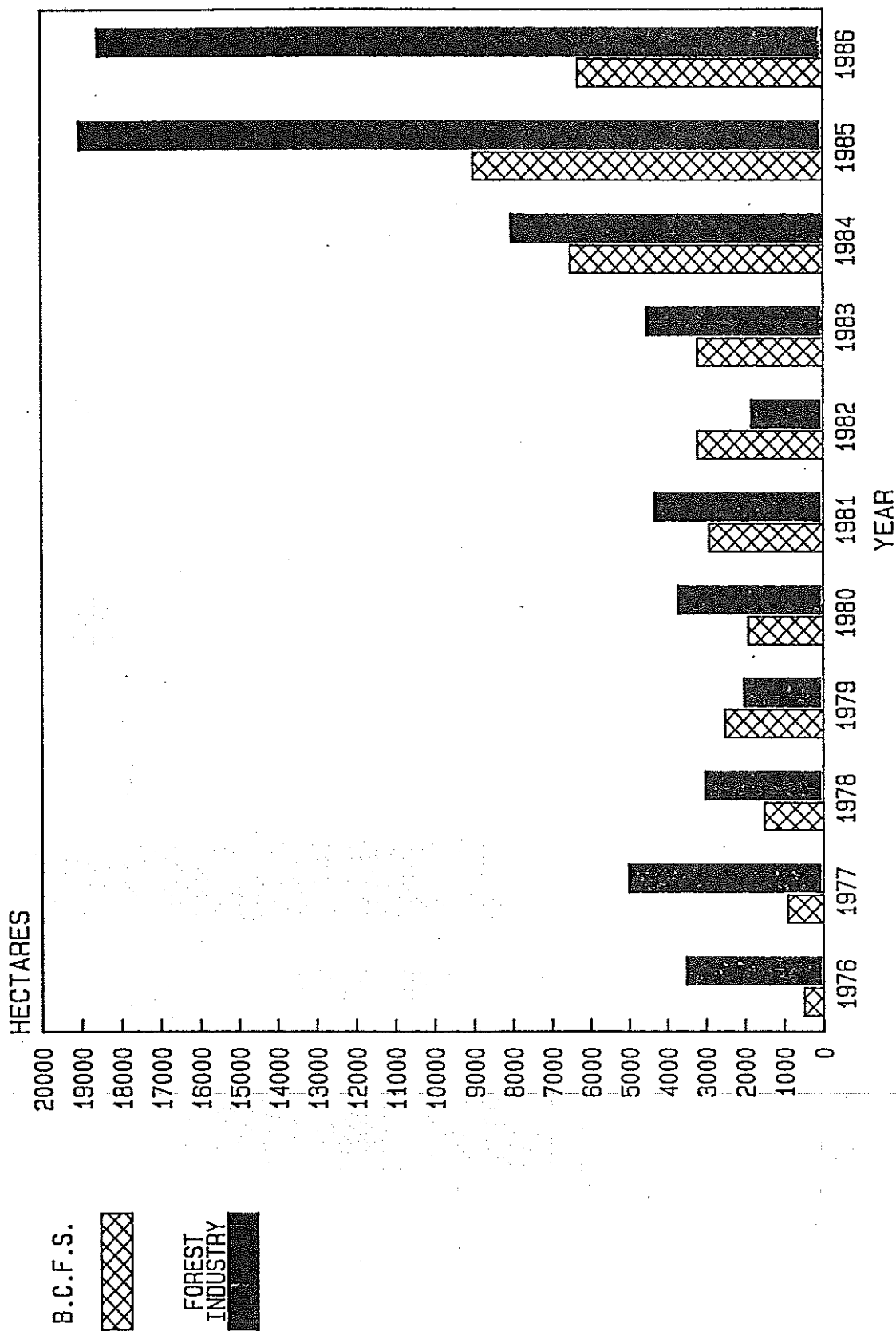
BY CONTROL PURPOSE, 1986¹



¹B.C. FOREST SERVICE & B.C. FOREST INDUSTRY COMBINED.
 - Prepared by P. Humphreys, Protection Branch

AREA (ha) TREATED WITH HERBICIDES FOR FORESTRY PURPOSES.

1976-1986



AREA (ha) TREATED WITH INSECTICIDES FOR FORESTRY PURPOSES.
1976-1986¹



¹ B.C. FOREST SERVICE & B.C. FOREST INDUSTRY COMBINED.

PUBLICATIONS AND REPORTS

- Alfaro, R.I., S.P. Taylor, E. Wegwitz and R.G. Brown. 1987.
Douglas-fir tussock moth damage in British Columbia, For. Chron. 63: 351-355.
- B.C. Ministry of Environment and Parks. 1987. Handbook for Pesticide Application and Dispenses: Forestry Supplement. (Produced by Protection Branch, B.C. Ministry of Forests and Lands), ISBN 0-7726-0667-6, (available from Pesticide Control Branch or Queen's Printer, Victoria).
- B.C. Ministry of Forests and Lands. 1987. Forest Protection Manual, Volume II - Pest Management, Protection Branch.
- Chapters Published:
- 1 - Introduction
 - 2 - Pest Detection and Damage Appraisal
 - 3 - Pest Management Strategies
 - 4 - Pest Management Information
 - 5 - Dwarf Mistletoes
 - 6 - Root Diseases
 - 9 - Bark Beetles
 - 17 - Pest Management Directives
 - 19 - An Abbreviated Glossary of Terms
- B.C. Ministry of Forests and Lands. 1987. Information Centre: Forest Pesticides; Volumes 1 through 7. Protection Branch.
- B.C. Ministry of Forests and Lands. 1987. A Quick Guide to Pesticides. Use and Regulation in B.C. Forest Management. ISBN 0-7726-0678-1 (6 ring binder), 49 pp.
- B.C. Ministry of Forests and Lands. 1987. Bark beetles - A Threat to Our Forests. ISBN-7718-8594-6, 19 pp.
- B.C. Ministry of Forests and Lands. 1987. Gypsy Moth - a Forest Threat from the East... and the South. PestTopic No. 9 (revised), 2 pp.
- B.C. Ministry of Forests and Lands. 1987. Forest Pesticides and Regulations in British Columbia. PestTopic No. 15 (revised), October 1987.
- B.C. Ministry of Forests and Lands. 1987. Forest Pests and Recreation Management. PestTopic No. 22, 2 pp.
- B.C. Ministry of Forests and Lands. 1987. Mountain Pine Beetle - a Menace to Pine Forests. PestTopic No. 24, 4 pp.
- B.C. Ministry of Forests and Lands. 1987. Managing Vegetation to Establish New Forests. PestTopic No. 23, 2 pp.
- B.C. Ministry of Forests and Lands. 1987. Herbicides and Forest Management in British Columbia. Unnumbered fact sheet, 2 pp.
- B.C. Ministry of Forests and Lands. 1987. Managing Vegetation in Provincial Forests. Unnumbered folder.

- Cozens, R.D. 1987. Silvicultural control of damage by spruce weevil Pissodes strobi Peck (Coleoptera: Curculionidae) in the central interior of B.C. For. Ser. Int. Rep. PM-PG-6, 16 pp.
- DeBoo, R.F. 1987. Completing the Formula for Management of Dry-belt Douglas-fir: Dealing with Pest. Paper prepared for Proc. Interior Douglas-fir Timber Management Workshop: A Review for practioners, Williams Lake, B.C., 8 pp.
- DeBoo, R.F. 1987. Preparing the Forester for Pest Management - a view from Provincial Government. For. Chron. 63: 244-245.
- Heath, R. 1987. Forest pest management and training from an industrial perspective. For. Chron. 63: 351-355.
- Humphreys, P. 1987. Pesticide Use in British Columbia Forestry, 1986. B.C. For. Ser. Int. Rep. PM-PB-28, 71 pp.
- Lewis, K.J. and R.D. Cozens. 1987. Douglas-fir Target Canker in the Prince George Forest Region. B.C. For. Serv. Int. Rep. PM-PG-7, 17 pp., appen.
- Lewis, K.J. and R.D. Cozens. 1987. Branch and Leader Dieback of Young Douglas-fir in the Prince George Forest Region. B.C. For. Ser. Int. Rep. PM-PG-8, 15 pp.
- Muir, J. 1987. Catalogue of pest management trials and demonstrations B.C. For. Serv. Int. Rep. PM-PB-30.
- Van der Kamp, B., Kumi, J., Muir, J. and Strang, R. 1986. Task force Report on root disease research. B.C. For. Serv. Int. Rep. PM-PB-29, 43 pp.

