



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.

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Pest Management: Really Now, What is it?

During recent travel, I have listened to several strong opinions about forest pests being only those nasty and obvious biting and chewing insects out there. I have also heard firm expression of position that pest management is that activity used only as a last resort to deal with these "things that move" in the forest. That is, when such pests can no longer be tolerated, pest control troops and treatments are deployed, especially to minimize or salvage some part of anticipated timber loss. Pest management is a reactive condition according to these individuals.

This may be the situation at times - particularly in the case of sudden and widespread damage as caused by bark beetles and budworms. But is this the job for pest management and/or for timber management specialists? And what about disease agents (e.g., fungi), weeds, brush, and other resource competitors in the forests of British Columbia? Who deals with them?

Perhaps the first step in gaining full appreciation of pests is to consider the definition endorsed by the Forest Pest Review Committee, the B.C. Forest Service, and other organizations: "Any organism or damaging agent designated as detrimental to effective resource management. Pests include certain insects, mites, fungi, bacteria, viruses, nematodes, plants, and vertebrates."

Secondly, it has been acknowledged by these and other groups that pest management is "the application of approved strategies to control or prevent pest infestations and damage. Pest management strategies and tactics include: (1) long term management to protect forest and range resources; (2) comprehensive silvicultural and harvesting operations; and, (3) pest-specific suppression methods."

As a result, forest pest management in B.C. is an essential ingredient in all stages of forest resource planning, and it is often the critical consideration for silvicultural prescriptions and for harvesting schedules. Pest prevention is the priority in B.C. Pest management must be a cooperative, collaborative, and shared responsibility to ensure success in forest management. And it requires trained and experienced specialists with both professional and technical backgrounds.

Look for more details in the revised and soon to be released Protection Manual (Volume II, Pest Management). In the meantime and thereafter, let's work together at getting our message across.

- R. DeBoo, Protection Branch, Victoria

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PEST MANAGEMENT PROGRESS

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Publisher's and Editor's Note:

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

Contributions labelled with an appropriate subject heading should be submitted to the Regional 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

Adieu, Farewell, and So Long. This issue of Pest Management Progress is the final issue to be edited by P.M. Hall. I would like to thank all involved for their cooperation and contributions and would also like to thank those responsible for assembling and producing each issue. This publication has been well received due to everyone's efforts.

The next series of issues will be edited by J. Henigman of Protection Branch. I am sure that PMP will continue to be a valuable contribution to pest management.

I will remember my experience as editor for some time to come.

- P. Hall, Protection Branch, Victoria

FRDA (Forest Research and Development Agreement) Pest Control Projects 1987-88. A wide array of pest control projects proposed by regional staff and others totaled \$364,000. The following were recommended to Silviculture Branch for funding:

Vancouver Forest Region

root rot impact	\$ 22,900
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Prince George

pine dwarf mistletoe stem analysis	\$ 20,000
tomentosus root rot trials	25,000
Douglas-fir canker survey	16,500
	<u>\$ 61,500</u>

Kamloops

root disease survey	\$ 19,900
spacing root-disease trial	9,500
	<u>\$ 29,400</u>

Nelson

white pine demonstration area	\$ 4,900
white pine spacing-pruning trial	2,500
larch mistletoe spacing trial	4,900
Armillaria root disease survey	14,500
	<u>\$ 26,800</u>

Prince Rupert

assess fall and burn for mountain pine beetle control	\$ 3,000
porcupine analysis and control	16,200
rust spacing trial	5,000
de-stumping trial	10,700
porcupine surveys	8,500
weevil permanent sample plots	2,000
	<u>\$ 45,400</u>

Protection Branch

Editorial and writing services for reports	\$ <u>14,000</u>
TOTAL FOR ALL PROJECTS	\$200,000

We understand that Protection Branch will have spending authority for these projects in 1987-88. Regional staff will be directly involved in contract administration and monitoring.

- J. Muir, Protection Branch, Victoria

Format for Technical Reports. A standard report format for FRDA project reports is required to convey the general conclusions and recommendations for management, and provide technical details of the methods, results, and conclusions. A standard format will be developed for contractors in consultation with Ministry staff.

- J. Muir, Protection Branch, Victoria

FRDA Pest Control Project Reports. Several reports were prepared by contractors for pest control projects funded by provincial, direct-delivery allocations under the Forest Resources Development Agreement. These reports included:

- Pest survey in young stands, Prince Rupert Forest Region, by Laing and McCulloch Forest Management Services, Smithers.
- Root disease survey methods for use with silvicultural surveys in the Merritt TSA by Pathocon Consulting, Vancouver.
- Causes of decline and mortality of subalpine fir in the Bulkley and Morice Timber Supply Areas of the Prince Rupert Forest Region by Pathocon Consulting, Vancouver.

- A field guide to the identification and assessment of root diseases in the southern interior of British Columbia by Pathocon Consulting, Vancouver.
- Impact of dwarf mistletoe on growth of lodgepole pine trees by Industrial Forestry Services, Prince George.
- Ingersoll Creek white pine demonstration area by Rod Martin Tree Improvement, Naksup.
- Investigation of the black army cutworm infestations in the Prince Rupert and Prince George Forest Regions by Mountain Pacific Forestry Ltd., Clearwater.
- Survey of tomentosus root rot and layout for a tree species trial near Tercer Lake, Burns Lake, B.C., by Silvicon Services Inc., Smithers.
- Efficacy of root removal in areas de-stumped for root disease control by Sterling Wood Group Inc., Victoria.

The reports will be edited and available shortly for distribution to those requesting copies.

- J. Muir, Protection Branch, Victoria

Catalogue of Pest Management Trials. A catalogue has been prepared of pest management or other related field trials and demonstration areas. This catalogue is intended to keep staff informed of field projects that have been established or are underway. Regional and district protection staff will complete a one-page report of each installation. These reports will be compiled and collated at Protection Branch and distributed to cooperators and, on request, to others who are interested.

- J. Muir, Protection Branch, Victoria

Pinewood Nematode Update. Recent events and activities concerning the pinewood nematode in B.C. were reviewed by the pinewood nematode committee of the B.C. Plant Protection Advisory Council.

The Council of Forest Industries was investigating the possibility of new lumber inspection rules and cooperating with the United Kingdom Forestry Commission in an attempt to avoid any restrictions to B.C. lumber exports to Europe.

Agriculture Canada, Plant Health (New Westminster), reported that although not all specimens have been processed, the nematode has been found throughout the province in wood chip samples collected by B.C. Forest Service staff.

The Canadian Forestry Service, Forest Insect and Disease Survey, reported that, so far, two out of 203 dead or dying trees that were sampled had the nematode. More specimens have yet to be processed.

Researchers at Simon Fraser University reported that their nematode identification technique should be available soon for use by forest agencies. Committee members endorsed a proposal to have SFU researchers demonstrate their technique at one or more workshops to be held in Scandinavian or European countries.

Research results from SFU apparently showed that morphological forms of the nematode were genetically identical, that the nematode was genetically distinct from another similar nematode, and possibly that collections of nematodes from France and Russia (USSR) were identical to those in North America. SFU researchers, in a forthcoming research publication, expressed a hypothesis that the nematode is widespread in northern temperate forests, but the wilt disease of susceptible tree species was prevented by unfavourable, cool temperatures.

Agriculture Canada, Plant Health (Ottawa), reported on the latest unsuccessful mission to Europe. The European and Mediterranean Plant Protection Organization rejected arguments from the North American Plant Protection Organization that the nematode posed no threat to Scandinavian or European forests. Furthermore, the European organization recommended further restrictions on wood chip and lumber imports from North America.

Although further restrictions could be imposed by the European Economic Community, Plant Health (Ottawa), hoped to persuade the EEC to defer restrictions until research could be undertaken in Canada and the United States to address their concerns.

An interagency and industry coordinating committee for the nematode has been established at Ottawa, and hopefully representation from B.C. will be included.

- J. Muir, Protection Branch, Victoria

Acid Rain. Air pollution in the Greater Vancouver-Lower Mainland-Fraser Valley area is becoming a concern. Monitoring of air pollutants by Waste Management Branch, Ministry of Environment and Parks, and by the Greater Vancouver Regional District have indicated that levels of ozone, on occasion, are above the threshold that is considered to be damaging to vegetation.

Forests in the area and especially forest nurseries are at risk to damage. To date, no visible damage to forest vegetation has been detected on sample plots established by the Canadian Forestry Service, Forest Insect and Disease Survey. However, ozone often results in growth impacts at levels below those

that cause visible injury. These low levels can lead to new or unusual outbreaks of insects and diseases that traditionally are innocuous or of minor importance.

Protection Branch and Vancouver Forest Region pathologists are participating in the Vegetation Impact Subcommittee of the Lower Mainland Oxidant Steering Committee, coordinated by Waste Management Branch, M.O.E.P. Recent activities have included a review of studies proposed or undertaken in Washington State by A. Basabe, graduate student, and R. Edmonds, Professor of Forest Pathology, University of Washington.

These studies, and others, have been undertaken by the U.S. National Acid Precipitation Assessment Program. Funding is provided by the U.S. Environment Protection Agency, U.S. Forest Service, and the U.S. National Council for the Paper Industry for Air and Stream Improvement.

The subcommittee in B.C. is planning several research and monitoring projects to be coordinated or integrated with the nearby projects in the USA. Currently, possible subjects include tests of susceptibility of tree seedlings and forest trees to air pollutants, and remote sensing of air pollutants and forest damage.

- J. Muir, Protection Branch, Victoria

Pest Survey Planning Committee. The committee of B.C. Forest Service and Canadian Forestry Service representatives have met on several recent occasions to discuss and resolve concerns and items of mutual interest.

The purpose of the committee, established by a memorandum of understanding between the two organizations, is to undertake cooperative surveys and other related activities for forest pests.

Recent items included 1987 survey plans, sharing data and establishing common standards for bark beetle survey data and overwintering survival, listings of pest trials and demonstration areas, general pest damage surveys for young trees, and preparation of displays of common forest insects.

Most of the working arrangements between CFS-BCFS staff are planned in detail at meetings in May-June at the Ministry regional offices. The Pest Survey Planning Committee helps to plan province-wide activities and facilitate local survey activities.

Anyone with concerns or items for consideration is requested to contact J. Muir, secretary for the committee.

- J. Muir, Protection Branch, Victoria

Pest Management in Nurseries. Infestations from several insect pests are anticipated at nurseries this year. The Lygus bug continues to be a problem on pine and spruce seedlings in the Prince George area. Spruce budworm will again be a significant pest in the Interior and several nurseries will be affected. As well as the established nursery pest management programs, the following extra projects have been planned for the 1987 growing season:

- Under contract to F.R.D.A. coastal-tac #2.29, the herbicide Goal will be tested using the protocols of the National Tree Nursery Weed Committee. This project is part of a Canada-wide cooperative program to gain registration for this herbicide in Canada.
- Several cooperative projects between the Ministry and other organizations have been planned. With the help of the Ministry of Agriculture and Fisheries bird control specialist, the bird repellent Avitrol® will be tested for control of crows at one nursery where they have been a significant nuisance. Under the direction of Dr. J. McLean at U.B.C., a student will be working on a project to develop a monitoring program for root weevils. Under the direction of Dr. J. Borden at S.F.U., an extensive two year program to study the basic biology, develop a monitoring program, and isolate a pheromone for the Lygus bug will be conducted by a Ph.D. student. In cooperation with P.P.G. Industries, the herbicide Cobra® will be tested for control of weeds and possible phytotoxicity to conifer stock.
- For the second year, small trials will be conducted at several coastal nurseries to control liverworts. The following pesticides will be tested: Thiram®, Maneb®, Simazine®, and Ronstar®.
- The balsam woolly aphid appears to be spreading beyond the established quarantine zone. Populations are now close to a nursery where the majority of true fir has been grown. A joint trial with Rona Sturrock of Pacific Forestry Centre, and the cooperation of Safer Ltd., will be conducted to develop new controls for this pest.

Air pollution from ozone is increasing in the lower mainland, and levels are high enough to cause significant crop damage. Preliminary studies are planned to determine the effect of ozone on conifer seedlings.

- G. Shrimpton, Silviculture Branch, Victoria

Pest Management in the Vancouver Region. The primary focus of the pest management program in the Vancouver Region for 1987 will be improved coordinated planning at the district level and development of strategies to ensure that a high level of pest management is practiced in the region's Tree Farm Licenses. Districts have been asked to produce comprehensive five year plans with clearly defined goals to facilitate budget allocations and provide input into Timber Supply Area plans. TFL management and working plans have, and will be, intensively reviewed to make certain that proposed pest

management programs are adequate. A meeting with one large licensee to incorporate additional pest management strategies into their M&WP occurred in April and further meetings will be held as necessary.

Active root disease control programs are in place throughout much of the region and additional operational research is planned to lower survey and control costs. Operational spruce leader clipping has been curtailed but surveys and applied research into weevil control are planned. Further aerial and ground surveys are planned to help prioritize salvage harvesting of blackheaded budworm killed timber in the Queen Charlotte Islands.

- D. Heath, Vancouver Forest Region, Burnaby

Pest Management Plan in Prince Rupert Region. Pest management is more than responding to insect epidemics. It involves a complex array of disciplines focusing on protecting the mature and immature forest resource. To facilitate this larger objective, districts of the Prince Rupert Forest Region have agreed to develop district specific pest management plans. The overall purpose of these plans is to establish realistic objectives, incremental to past achievements and involving commitments not only from the District Manager, but also from licensees and other agencies. This plan is designed to be concise, practical, and measurable while its appendices are to contain the support information. If this system works, we can update these plans annually with little extra effort.

- M. Geisler, Prince Rupert Forest Region, Smithers, and B. Hutchinson, Bulkley Forest District, Smithers

Silviculture Manual Insert #11. The following changes with regards to pest damage standards for free growing seedlings have been implemented in the Prince Rupert Forest Region: (1) stem wounds from mice, rabbits, squirrels, and porcupine greater than 1/3 of stem circumference are unacceptable (i.e., same as provincial standards); (2) weeviled stems are unacceptable if: (a) the crook in the bole extends beyond the line of the stem prior to attack. Borderline trees and trees with post-attack stems within the line of the bole are acceptable. All trees with crooks must have evidence of a dead branch stub to be classified as weeviled. Stems with crooks exceeding the bole line are acceptable if no dead branch stub is present; (b) trees have recent attacks (current or < 1 year old) since there are no methods of pre-determining future tree form during the survey; and, (c) the top is forked and dominance has not been expressed between competing laterals. This standard is the same as current silviculture guidelines for forked tops.

- W. Martin, Prince Rupert Forest Region, Smithers

Young Stands Surveyed for Pests. Forty-nine young stands, between 13 and 23 years from establishment, were surveyed for pest incidence in the Prince George and McBride Timber Supply Areas. Incidence data were stratified by species planted, subzone, and forest district. The most significant pests were: lodgepole terminal weevil; western gall rust; Warren's root collar weevil; and northern pitch twig moth on lodgepole pine; leader dieback caused by *Sclerophoma* spp. on Douglas-fir; white pine weevil on interior spruce; and, environmental damage to all species. This work provides useful indications of the pest status of young stands in two TSA's in the Prince George Forest Region. Improved site prescriptions and increased monitoring of plantations and young stands will benefit intensive forest management programs.

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

Pest Management Training. A report by a task force on training, Internal Report PM-PB-24 "A Review of Pest Management Training in the B.C. Forest Service," was revised and is now available on request.

An implementation committee of J. Muir (Protection Branch), D. Gray (Nelson Forest Region), and T. Szamecz (Human Resources Branch) developed a tabular questionnaire on pest management training needs and priorities. Following responses by regions and districts, work will begin on developing one or two of the most needed sections or modules. A period of two-three years is expected to develop several sections including pest identification, surveys, control options, and plans.

- J. Muir, Protection Branch, Victoria

Pest Management Training for Juvenile Spacing Contractors. A recent training program put together by regional/district silviculture staff afforded pest management the opportunity to train prospective contractors in pest identification, and in particular, rusts and cankers of lodgepole pine. Approximately two dozen contractors were present for the two training sessions in the Lakes and Morice TSA's.

- W. Martin, Prince Rupert Forest Region, Smithers

Forestry Workers Training. Brief introductions to forest entomology and pathology were given by both regional specialists to about 150 students enrolled in Northwest Community College's "Forestry Workers Training Program". These students will enter the FORSAR program which does a considerable amount of juvenile spacing, brushing and weeding, and falling and burning.

- T. Ebata, Prince Rupert Forest Region, Smithers

Pest Identification Training. Pests of mature and young stands are causing increasing concern. Hard data, however, on pest damage and responses to various treatments is scant. There appear to be several good reasons for this, one of which is a general unfamiliarity with pests. District staff of the Prince Rupert Forest Region have requested a short course on basic identification of the major pests within their district.

Two pest ID training courses have been developed and will be offered during the summer of 1987; one for coastal pests and the other for interior pests. Each course will be field oriented, last for one day and will be open to licensees and contractors as well as district staff.

- M. Geisler, Prince Rupert Forest Region, Smithers

Pest Management Displays. In the past four months, pest management displays and other forestry promotional material (MPB model, forestry computer games, and the gypsy moth mini-display) were exhibited at nine locations across the province. Agencies interested in borrowing these displays should contact S. Taylor, Ministry of Forests and Lands, Protection Branch, 1450 Government Street, Victoria, B.C. (387-8743).

- S. Taylor, Protection Branch, Victoria

Pest Management Field Guide for the Prince Rupert Forest Region. A pest management field guide was developed for the Prince Rupert Forest Region. It provides information on hosts, features to look for during different surveys, damage, what it may be confused with, and management options. Colour photos illustrate key features for eighteen pests common to the region. In addition, a probers field guide for fall and burn layout provides information on regional standards and bark beetle identification. Copies of the draft have been distributed to both the Prince George and Cariboo Forest Regions. Printing of the guide is scheduled for June 1, 1987.

- W. Martin, Prince Rupert Forest Region, Smithers

Joint Agriculture Canada - Ministry of Forests and Lands Mistblower Purchase. A FMC model 100F mistblower was purchased jointly by the above agencies for ground spray operations against the gypsy moth. This equipment consists of a 29" diameter blower capable of 2600 RPM mounted on a swivelling platform, giving the operator a 360° turning radius. In addition, the blower is attached to a yoke so the operator's spray trajectory ranges from flat to vertical. The resulting spray produced should provide better control than other available ground equipment. Future applications for this machine are

not limited to insect control but may include vegetation management projects, e.g., roadside brush control. Individuals interested in more details should contact S. Taylor, Ministry of Forests and Lands, Protection Branch, 1450 Government Street, Victoria, B.C. (387-8743).

- S. Taylor, Protection Branch, Victoria

Porcupine Management Plan for the North Coast T.S.A. A porcupine "problem analysis" may provide the Ministry of Forests and Lands with some new strategies with regards to porcupine control. At present, the long term control strategy in the North Coast is to re-establish the fisher in as much of the TSA as possible. The success of this strategy is somewhat dependent on attaining a closure of traplines in the North Coast. Many of the traplines are not being actively trapped at the moment, but this could change in the future.

Management of areas that have already received appreciable damage from porcupines often require some form of treatment if the stand is to reach rotation age. Hence, two Sx/Px sanitation trials have been proposed to ensure that stands with a history of porcupine attack reach rotation age:

(1) selected crop trees will be "collared" with an inverted funnel and surrounding non-crop trees felled; and, (2) alternate choice of crop trees (i.e., balsam and cedar) in stands where it is possible (e.g., minimum of 500 spm).

Free growing reclassification surveys will be used to determine which of the older second-growth stands have porcupine damage. Stands with porcupine damage will be considered non-free growing and will be scheduled for resurvey ten years hence. Hence, until these stands receive some form of treatment, it is unlikely that they would contribute to the AAC. Regeneration/survival surveys will be used to collect incidence of porcupine damage in younger second-growth stands.

- W. Martin, Prince Rupert Forest Region, Smithers

Porcupine Damage in the Kalum Forest District. Porcupine control surveys were established in the fall of 1986 in drainages north of Terrace where most of the juvenile spacing has occurred in the last 5-10 years. Twenty line transects totalling 16,068 m of sample line were established on Crown land, while 16,000 m were surveyed on TFL 1 - Demonstration Forest. On Crown land, 2.36% of stems sampled were attacked, 0.44% being current while 1.92% were old attack. On TFL 1, 3.6% of stems sampled had been attacked, 0.72% being current attack. Except for isolated attacks on balsam or lodgepole pine, porcupines have been attacking western hemlock and Sitka spruce. Given that only three porcupines were killed as a result of the bounty system open

to registered trappers, it is unlikely that it will be continued in the future. However, four dozen "live" traps have been purchased and will be used to trap porcupine in those areas where porcupines have been causing damage.

- W. Martin, Prince Rupert Forest Region, Smithers

Porcupine Damage in Khutzeymateen Inlet. The most recent survey of porcupine damage in Khutzeymateen Inlet (March 1987), where fisher have been released as a long term control measure indicated an average of 7.3% current attack overall. Although it appeared from last year's survey that the fisher may be providing some measure of control, this year's data do not. Current attack was lower (2.2 and 5.1% for transects 1 and 2) on the control side of the Inlet as compared to the fisher side (6.2 and 20.4% for transects 3 and 4). This confirms that we need to introduce an adequate number of fisher to the south side of Khutzeymateen Inlet. We have earmarked \$5000 to help purchase fisher in 1987/88.

- W. Martin, Prince Rupert Forest Region, Smithers

FOREST ENTOMOLOGY

Aerial Sketch Mapping in the Cariboo Region. The results for the 1986 aerial sketch mapping project were unavailable when the November 1986 version of the Pest Management Progress report was produced. The gross beetle losses were as follows:

	<u>Area</u> (ha)	<u>Volume</u> (m ³)
Mountain pine beetle and <u>Ips spp</u>	107 224	1,274,098
Douglas-fir beetle	648	3,542
Spruce beetle	49	520
Balsam bark beetle	598	4,879
Total	108 519	1,283,039

The figures for the mountain pine beetle losses include losses caused by Ips spp. because it is very difficult to distinguish between the two pests from the air. As well, these figures are somewhat exaggerated because it is often difficult to age attacks during sketch mapping and, therefore, a lot of the infestations marked on the sketch maps are two or more years old.

- W. Mussio, Cariboo Forest Region, Williams Lake

Mountain Pine Beetle Overwintering Mortality Study for the Cariboo Region.

Unlike the previous two winters, the winter of 1986/87 was mild and the overwintering survival of the mountain pine beetle in successfully mass attacked trees is high. In the five forest districts of the Cariboo Forest Region, percentage survival ranged from 44.6 to 94.7% with an average of 68.2%.

Therefore, the mountain pine beetle which were able to successfully mass attack and colonize have very high survival rates and a potential to increase once again to epidemic levels.

- W. Mussio, Cariboo Forest Region, Williams Lake

MPB Winter Mortality in the Prince Rupert Region. Fourteen sites were sampled in the three interior forest districts to obtain an estimate of the winter mortality. Due to unseasonably mild winter conditions, larval survival averaged 75.0%.

Adult survival was also high at about 70%. This may cause problems next summer since these parent adults may emerge this spring and begin new brood galleries resulting in a second flight in September.

- T. Ebata, Prince Rupert Forest Region, Smithers

Bark Beetle Program 1986/87. There were approximately \$8.2 million allocated for the 1986/87 bark beetle program. Initial allocations to individual forest regions were itemized in the last issue of Pest Management Progress. As in past years, projects funded included: aerial and ground surveys including aerial photography; purchase and placement of semiochemicals to concentrate pine beetle attacks in pre-selected areas; single tree treatment programs; and, access construction or upgrading. Final expenditure and activity reports are expected to be available by June, 1987. The program is expected to continue in the 1987/88 fiscal year.

- P. Hall, Protection Branch, Victoria

Bark Beetle - Related Harvesting - 1986. Harvesting remains the most effective and efficient method of dealing with bark beetle infestations. A direct result of the ongoing bark beetle management program throughout the province is the redirection of harvesting priorities to address identified beetle infestations. As well, in some areas, the level of harvesting has been increased to deal with bark beetles.

Timber harvested in 1986 in response to bark beetles, especially mountain pine beetle, is summarized below. This harvesting effort, in conjunction with the survey and single tree treatment programs, is expected to greatly reduce the rate of spread of specific outbreaks. Further, this harvesting ensures that wood values are recovered before significant degradation occurs. In the table below, volumes indicated under normal quotas are totals from all forest tenures including Tree Farm Licenses, Timber Sale Licenses, Forest Licenses, and the Small Business Enterprise Program.

Beetle-Related Volumes Harvested in 1986

<u>Region</u>	<u>Volume Harvested (m³)</u>		
	<u>Normal Quota</u>	<u>Over Quota</u>	<u>Total</u>
Cariboo	2,684,143	2,155,252	4,839,395
Kamloops	2,266,944	194,558	2,461,502
Nelson	1,220,392	61,000	1,281,392
Pr. George	2,053,053	155,000	2,208,053
Pr. Rupert	961,253	99,702	1,060,955
Vancouver	46,391	0	46,391
Total	9,232,176	2,665,512	11,897,688

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

Special Bark Beetle Funding 1986/87 in the Nelson Region. The Nelson Region received \$658,000 in special funding for bark beetle detection and control. Twenty-four projects were completed, which included aerial and ground detection surveys to prioritize stands for control actions, new road and bridge construction, road access upgrading, pheromone containment, and cut and burn, as shown in the following summary.

Nelson Region Bark Beetle Project Summary 1986/87

	No of Projects	Surveys (M ha)		Access (km)		Phero (ha)	Cut Burn	Vol Under Attack Harvest (M m ³)
		Aerial	Ground	Road	Bridge			
Total	24	1 557	22.5	31	1	1 870	9 925	1 280

- E. Morris, Nelson Forest Region, Nelson

Pine Beetle Semiochemicals. The Cariboo Region intends to deploy 18,000 baits this year in the continuing bark beetle program. The primary uses will be "spot baiting," "mop-up baiting," and "grid baiting" on a limited scale. The Cariboo Region will conduct a June overview aerial survey to map 1986 attacked pine trees. These trees will be treated by "Sevin" immediately or a nearby tree will be baited and that tree treated either by MSMA or by felling and burning after the beetle flight.

- D. Doidge, Cariboo Forest Region, Williams Lake

Semiochemicals for Mountain Pine Beetle Suppression in Prince George Forest Region. A total of 6129 semiochemical baits were deployed for containment and monitoring of mountain pine beetle in the Prince George Forest Region in 1986. Some 53% of lures were used for grid-baiting and 47% were deployed as single-tree baits. Semiochemicals were mainly used for containment of beetles prior to harvesting and for mop-up after disposal. Baited Lindgren funnel traps were used in two districts to monitor the time and intensity of the mountain pine beetle flight. Semiochemical baiting was cost-effective and the program will continue in the Prince George Forest Region in 1987.

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

Mountain Pine Beetle in Mt. Robson Park. In mid-November, 1986, a six person interagency crew conducted a week of ground probing for detection of mountain pine beetle in Mt. Robson Park. Participants included staff from the B.C. Forest Service in McBride and Prince George, Ministry of Environment and Parks (Prince George), and Canadian Forestry Service (Victoria). A total of 48 green-attacked and 37 red-attacked trees were marked and these were piled and burnt in January, 1987. Intensive ground and aerial detection will continue in 1987 with semiochemical baiting of disposal sites. MSMA will also be used in key locations for post-attack injection of freshly attacked pine in early August.

- D. Cinnamon, McBride Forest District, McBride, R. Hodgkinson and R. Cozens, Prince George Forest Region, Prince George, R. Turnquist, Canadian Forestry Service, Victoria, and J. Hopkins, Ministry of Environment and Parks, Prince George

Mountain Pine Beetle in the Prince George Forest Region. Two anomalous patterns of mountain pine beetle life cycles were observed in the Prince George West and Vanderhoof Districts in February 1987. One lodgepole pine examined in Prince George West had two distinct sizes of larvae and had clearly been attacked on two separate occasions in 1986. A second pine

examined in Vanderhoof had 80% of its circumference attacked in 1985 and the remaining 20% attacked in 1986. Such observations reinforce perceptions of mountain pine beetle's adaptability to local climatic conditions.

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

MPB Fall and Burn Effectiveness Study (FRDA). This winter the Prince Rupert Forest Region layed out six 9 ha plots in three sets of paired plots in an attempt to determine the effectiveness of our fall and burn program.

Each pair of plots was layed out in similar timber types with similar pine beetle infestations. The plots were intensely probed and cross-gridded in 25 m intersects for accurate plotting and future follow-ups. Of each pair, one plot was felled and burned and the other left as a control. All plots will be reassessed annually for the next three years. By comparing the numbers of current attacks within control and treatment plots, the efficacy of fall and burn will be evaluated.

- R. Klassen, Prince Rupert Forest Region, Smithers

Update on "Future Plans" for Entomology in 1987, Prince Rupert Forest Region. Heavy winter mortality and a lack of susceptible host has negated the necessity for preparing lethal spruce trap trees this spring for spruce beetle management. In addition, access into the area in question is being developed.

The PM-PR report entitled "Fall and Burn: does it work?" by Kevin Widen will not be available until it is updated with results from the FRDA Fall and Burn effectiveness trial (see this issue of PMP).

MSMA will be used as a post-attack treatment for MPB this summer in the Lakes Forest District. This technique has proved effective in the Kamloops and Cariboo Regions, but prolonged periods of attack, brought about by a high incidence of two year cycle MPB, reduced the effectiveness of earlier trials in the Prince Rupert Region. This year, the MPB are nearly all on a one year cycle; thus, the treatment window will be better defined and efficacy should be improved.

- T. Ebata, Prince Rupert Forest Region, Smithers

Mountain Pine Beetle Prober Training. Proper training for district, licensee, and contractor's staff will continue this year with a session planned for fall 1987. It is generally agreed across the region that this course not only has

improved probing quality, but also made it more consistent. Course duration is two days and consists of three main parts.

- Beetle Biology and Standards
 - Field probing
 - Exam
- M. Geisler, Prince Rupert Forest Region, Smithers

Bark Beetle Program 1987/88. The program will continue in the 1987/88 fiscal year with a provincial allocation of approximately \$9.7 million. As in past years, these funds shall be allocated to regions and districts on the basis of priorities established through project submission and review. The general structure of the program will remain the same.

The status of mountain pine beetle outbreaks in the province has changed somewhat over the past few years as a result of severe winter conditions in 1984/85 and 1985/86 and because of the aggressive management program. Outbreaks have declined in some areas (notably the Cariboo) and have remained relatively static in others. A few regions report expansions. Significant gains can be made in continuing the current program.

- P. Hall, Protection Branch, Victoria

Bark Beetle Program Technical Audits. Audits of the bark beetle program will be continuing this year. Prince Rupert and Nelson Forest Regions were audited in early May of 1987. Other regions and projects for review will be selected, most likely in the fall.

- P. Hall, Protection Branch, Victoria

Beetle Program Evaluation. The beetle management program which began in 1984 has seen the expenditure of significant funds and resources in an attempt to reduce losses to the mountain pine beetle and other bark beetles. Although it is felt that the program has been successful, a quantitative assessment of the program's effectiveness is required. Such an evaluation must consider all aspects of the control program including single tree projects, access development, and prioritized harvesting and determine their impact on specific infestations or situations. Key to the evaluation is the need to find a rational method of assessing the projected course of particular outbreaks without any applied management.

An evaluation of the bark beetle program is being planned to begin this year.

- P. Hall, Protection Branch, Victoria

Beetle-Proofing Through Thinning. As reported in the last issue of Pest Management Progress, demonstrations of pine thinnings to reduce losses to mountain pine beetle will be established in B.C. Plots have been located and marked in the Merritt District of Kamloops Forest Region. Thinnings are expected to be carried out in the fall of this year. Other demonstration areas for this treatment are being sought.

- P. Hall, Protection Branch, Victoria

Mountain Pine Beetle Insecticide Trials. On October 8, 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. Efficacy sampling will be conducted in early June 1987 to determine if topical applications of chlorpyrifos to the bark exterior are effective in killing developing larvae. (*Agricultural Weed Killer - a selective herbicidal (mineral) oil marketed by Shell Oil.)

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

Bark Beetle Booklet. A booklet on bark beetles is expected to be published this summer. This booklet is similar in format to existing booklets on "The Real Enemy," "Pesticides in Forest Management," and "Disease Management." This series provides non-technical background to a variety of pest management issues.

- P. Hall, Protection Branch, Victoria

Western Spruce Budworm (*Choristoneura occidentalis*) in B.C. The recent expansion of budworm infestations has reached over 400 000 ha, primarily in the Kamloops Forest Region. This outbreak in the dry-belt Douglas-fir stands is of concern as much of this area is managed through faller's selection, multiple pass regimes.

This management approach depends on the continued health and growth of the understory; this understory is being heavily defoliated by budworm. Three aspects of this problem are being examined in 1987 so that sufficient information is available to plan treatment options in future years should the outbreak continue or recur. Studies include:

1. establishment of 64 permanent sample plots in typical areas to determine what damage and impact are actually occurring;

2. operational trials using B.t. to establish efficacy and to determine the feasibility of protecting the understory in multiple canopied stands using conventional aerial spray technology; and,
3. reviewing alternatives for managing dry-belt Douglas-fir in light of budworm impacts through a rotation.

Information from the above studies will form the basis for future decisions. Similarly, this information will be valuable for establishing a general defoliator management strategy for B.C.

- P. Hall, Protection Branch, Victoria

Spruce Budworm in Fort Nelson Forest District (Prince George Region). Spruce budworm, Choristoneura fumiferanae, infested some 1-1.5 million hectares of spruce in the Fort Nelson Forest District in 1986. Aside from damage in mature stands, defoliation occurred in 3-5 year old plantations. In late March 1987, mid-crown branches were sampled from mature spruce in three areas. Samples were sent to the Forest Insect and Disease Survey (Canadian Forestry Service) in Victoria for extraction of overwintering 2nd instar larvae. Subsequent larval samplings and pheromone trapping of adults will be undertaken in the summer. Further collection of population data is necessary before any control actions can be considered.

- R. Cozens and R. Hodgkinson, Prince George Forest Region, Prince George, and M. Pedersen and J. Thompson, Fort Nelson Forest District, Fort Nelson

Western blackheaded budworm (Acleris gloverana) Outbreak in the Queen Charlotte Islands - An Update. Egg sampling conducted jointly by the Forest Insect and Disease Survey (Canadian Forestry Service), B.C. Forest Service, MacMillan Bloedel Ltd., Western Forest Products Ltd., and Crown Forest Industries Ltd. indicate a greatly reduced budworm population for 1987. It is now thought that the current outbreak is collapsing and, hopefully, will cause little additional defoliation this summer. Some stands have now received three years of defoliation, just over half have received two years of defoliation and roughly 35-40% have only been defoliated once. Although the defoliation was widespread (44 300 ha) and severe in many locations, it is believed that most stands will recover. However, some patches of mortality are expected.

As reported previously (PMP, November 1986), MacMillan Bloedel Ltd. is preparing to establish a number of damage appraisal plots in defoliated stands this spring to measure some of the impacts of budworm damage. These plots will augment the 15 plots previously established by Western Forest Products.

Surveys will also be conducted this year to identify and prioritize damaged stands for possible salvage and rehabilitation.

- D. Heppner, Vancouver Forest Region, Burnaby

Black Army Cutworm (Actebia fennica) Working Group. Black army cutworm represents a potentially significant pest of reforestation. This insect, although well known in agriculture, has only recently arisen as a forest-related problem - defoliating and killing seedlings in newly planted plantations. A small working group comprised of interested parties from the Forest Service, Canadian Forestry Service, and universities held an initial meeting to discuss and establish research and development priorities relating to this pest. These guidelines are intended to provide some coordination and direction to anyone contemplating or actively carrying out work related to black army cutworm.

- P. Hall, Protection Branch, Victoria

Black Army Cutworm in the North Thompson. A problem analysis was undertaken to assess the potential impact of black army cutworm on backlog reforestation efforts in the North Thompson Valley of the Kamloops Forest Region.

Analysis of 26 recorded black army cutworm infestations in the study area revealed four locations of seedling damage. The only association between the damaged locations was the interval between burning date and planting date (1.5 years). Surveys were established to determine current stocking levels, and due to natural ingress, only one plantation was found to be below the minimum stocking standard.

Types of seedling damage and the factors associated with the severity of damage are identified. The hazard and risk components of black army cutworm infestations are identified and discussed. Based on this investigation, the potential impact of this pest in the North Thompson Valley is concluded to be low.

Recommendations are given to identify methods by which the potential of black army cutworm to cause seedling damage can be minimized.

Report available from Alan Vyse, Kamloops Forest Region (828-4158).

- A. Vyse, Kamloops Forest Region, Kamloops

Black Army Cutworm Parasitism in the Prince George Forest Region. On July 1, 1986, 100 black army cutworm pupae were collected from an infested cutblock in the Prince George West Forest District. Pupae were placed in a

screened rearing cage with 4 cm of soil and were then lightly covered with 1 cm of soil to simulate field conditions. Soil humidity was maintained. The first successfully emerged adult was observed on July 21st. Subsequently emerging Ichneumonid parasites and all unemerged pupae were sent to the Forest Insect and Disease Survey (Canadian Forestry Service) in Victoria for an identification of parasites and a determination of mortality. Survival was only 2%; 65% of the unsuccessful pupae were parasitized by Ichneumonid species, 2% were possibly infected by a nuclear polyhedrosis virus, and 8% died from unknown causes. The above rate of parasitism was the highest observed in the Prince George Region since rearing projects began in 1983.

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

Gypsy Moth Trapping Survey. The B.C. Forest Service will again be cooperating with Agriculture Canada, Plant Health Division, and with CFS/FIDS in conducting a pheromone-based survey for gypsy moth throughout B.C. in 1987. The Forest Service expects to distribute approximately 2000 traps in recreation sites and forested areas in all regions of the province during the coming summer. The total trapping program will provide early warning of gypsy moth introductions.

- P. Hall, Protection Branch, Victoria

Gypsy Moth Treatment Program - 1987. The 1986 cooperative survey effort identified three areas in the province where multiple catches of male gypsy moths occurred. These areas were: CFB Chilliwack, Victoria, and Kelowna. Egg masses were subsequently found in Chilliwack and B.t. eradication sprays will be conducted in May of 1987 over the potentially affected area. No egg masses were found at the other two locations and these sites will be intensively trapped in 1987 to clarify the situation.

- P. Hall, Protection Branch, Victoria

Expansion of Balsam Woolly Aphid (*Adelges piceae*) Infestation Zone. This winter, forest engineers working for B.C. Forest Products (BCFP) on West Thurlow Island (TFL 45), found dead and dying *Abies amabilis*. Branch samples, subsequently sent to Forest Insect Disease Survey (Canadian Forestry Service), Victoria, showed characteristic symptoms of gouting. A number of aphids were also found and identified as BWA (*Adelges piceae*).

This newly detected infestation is significantly outside the previously known zone of infestation. It is also outside of the regulated zone as defined in the BWA Regulations (Plant Protection Act) administered by the B.C. Ministry of Agriculture and Fisheries.

BCFP, with the assistance of the FIDS, have surveyed the island. They reported that approximately 30% of the amabilis fir over the 150 ha area near Blind Channel are dead and that the remaining scattered true fir are lightly to severely infested. Amabilis fir comprises about 10% of the stand. Based on gouting and condition of some of the dead fir, it is estimated that the infestation started in the mid-1970's (FIDS, Pest Report, April 1987, R.L. Ferris).

BCFP is now planning to harvest the infested stands.

Additional surveys are being planned by the B.C. Forest Service and FIDS for this summer to determine the full extent of this expansion.

This expansion will affect the current revisions to the BWA Regulations and will likely bring the Campbell River Nursery into the regulated zone.

- D. Heppner, Vancouver Forest Region, Burnaby

Update on Leader Weevil Surveys in Spruce (FRDA). Two projects involving leader weevil were completed in the Kitimat Valley. The first project involved stem mapping twelve growth and yield plots containing twelve year old Sitka Spruce. Each plot contained 64 tagged and measured trees surrounded by a buffer of 200 or more trees. The contractor dated attacks and noted their location on a series of mylars, each representing one year's attacks. The mylars overlayed a stem map of each plot and gives a graphic representation of the distribution and intensity of attacks over the last four years. Re-surveys are planned biannually to determine if the level of damage increases and if the attack pattern stabilizes. Results show that weevil attacks have increased dramatically during the last three years.

The second project involved testing a new strip sampling method that will produce more accurate current attack estimates for an intensive survey (treatment efficiency, damage monitoring). Twenty 5m wide strips, each containing 25 Sitka spruce, were placed systematically in 12 plantations.

Back dating pest attacks during the 1987 survey revealed that this method generally underestimated the level of pest attacks when compared to annually collected data. This may have resulted from the requirement for a dead branch stubs to be evident for the contractor to positively identify weevil damage.

Fifty m² circular plots were also sampled with the strip plots to see if these plots would be adequate for obtaining weevil damage data during free-growing surveys. In nine of twelve plantations, circular plot estimates were not significantly different from strip plots. The circular plots tended to underestimate the level of damage. Circular plots appear to provide adequate estimates of damage, but at least twenty plots per plantation should

be tallied. To detect more significant levels of weevil damage, surveys should be performed at least twelve years after planting instead of eight or less years.

- T. Ebata, Prince Rupert Forest Region, Smithers

Research Summary of Developments of Sitka Spruce Phenotypes Resistant to *Pissodes strobi*. A report summarizing various research projects in B.C. on the development of Sitka spruce phenotypes resistant to the leader weevil, *Pissodes strobi*, has been completed by the Vancouver Region, B.C. Forest Service. Recent research projects were categorized into three areas: the selection, field testing, and clonal propagation of apparently resistant individuals; the elucidation of the mechanisms by which the weevil selects individual host trees for feeding and oviposition; and, the identification of the mechanisms of resistance in Sitka spruce.

The report concludes that considerable research has been conducted but that more is required before resistant phenotypes will be available for use in reforestation. It also states that resistance will not likely be a panacea but rather a component of an integrated approach. It recommends continued support of research into this development, equal support to alternative control methods so as to develop an integrated approach, replication of field trials using putatively resistant genotypes, and support for research into methods that allow for the systematic screening of candidate resistant trees.

Copies of the report are available from Pest Management, Vancouver Regional Office in Burnaby.

- D. Heppner, Vancouver Forest Region, Burnaby

Predator/Parasite Enhancement for Leader Weevil Control. Research conducted by the Canadian Forestry Service (CFS) has shown that natural predators and parasites can have significant impacts upon weevil broods, *Pissodes strobi*. Work has commenced by the B.C. Forest Service, CFS, and CIP Inc. to conduct operational trials on predator/parasite enhancement in Sitka spruce plantations to augment leader clipping as a method of controlling weevil damage.

The CFS has identified screen grid dimensions which will contain weevils yet allow the predators and parasites (generally smaller sized insects) to escape. Clipped infested leaders can then be caged and the natural predators and parasites utilized to further the control effort.

- D. Heppner, Vancouver Region, Burnaby

Lodgepole Terminal Weevil Px Trial. In the winter of 1986, thirty permanent sample plots in six lodgepole pine stands were established to determine if lodgepole terminal weevil, Pissodes terminalis, causes sufficient defects and/or growth losses to justify control actions. Plots were established in both natural and managed stands and will be remeasured every three years for a twenty to thirty year period. After the first measurement, 13.6% of the lodgepole pine have been infected by the weevil. 2.1% of the trees were attacked in 1986.

- W. Mussio, Cariboo Forest Region, Williams Lake

Depletion Plots in Subalpine Fir. Western Balsam Bark Beetle, Dryocetes confusus, is probably the most serious cause of tree mortality and volume loss in the Bulkley TSA. However, an adequate estimate of the depletion rate has not been done.

To help address this problem, regional and district Inventory staff have installed four depletion plots to determine the rate at which dead subalpine fir degrades from "Grey potential" to "Grey, dead and useless," and to calculate the subsequent volume loss. In addition, trees within the plot were assessed for current attacks by balsam bark beetle. The rate at which the trees die, turn red and then grey will also be obtained during annual remeasurements.

More plots may be established in the near future as resources permit.

- T. Ebata, Prince Rupert Forest Region, Smithers

Cone and Seed Insect Control in Seed Orchards. A minor use registration proposal for the use of Metasystox-R® (MSR) against Douglas-fir cone and seed insects has been accepted. Operational efficacy trials in 1983 and 1984 showed that foliar applications of 0.25% - 0.5% a.i. MSR significantly reduced damage by Douglas-fir cone gall midge, the principal pest in coastal Douglas-fir seed orchards. Testing now centers on the efficacy of lower rates and the efficacy of MSR against spruce cone and seed insects.

- D. Summers, Silviculture Branch, Victoria

Regional Insect Display Boxes. This project, also reported in the last issue of Pest Management Progress, is nearing completion. With the assistance of the CFS/FIDS, insect specimens and photos have been assembled for each of the forest regions. When the display boxes are finally completed, displays will be assembled and forwarded to regional offices for use in displays and training.

- P. Hall, Protection Branch, Victoria

FOREST PATHOLOGY

Root Disease Guidelines. Regional guidelines for detection and treatment of Phellinus weirii, Forest Service Internal Report PM-V-6, have been completed and are available from the Vancouver Regional Office. They make recommendations on how to approach root disease management in existing stands, establish criteria for surveys and early stand harvest, and review alternate strategies for post harvest treatment of infected stands. The guidelines have recently been reviewed by a major coastal licensee and will be largely incorporated into the management and working plan of one of its TFL's.

- D. Heath, Vancouver Forest Region, Burnaby

Root Disease Impact and Control Research in the Vancouver Region. Recent analysis of regional root disease surveys indicate Phellinus weirii levels in medium-good coastal Douglas-fir stands approach 18% of stand area in the CDFb and CWHa subzones. General operational trials and basic research programs are planned or underway to develop effective responses to the disease. They include:

- (i) analysis of ecological site factors which affect disease behaviour and impact;
- (ii) investigations into the use of remote sensing as an effective detection tool; and,
- (iii) evaluation of host-specific spacing or commercial thinning regimes to reduce disease spread in managed stands.

The above projects all represent cooperative programs between the B.C. Forest Service, industry, the Canadian Forestry Service, and local universities.

- D. Heath, Vancouver Forest Region, Burnaby

Root Disease in Coastal Backlog Reforestation Areas (FRDA Research Project 2.28). This project was initiated in 1986 to assess the occurrence and hazards of root diseases in coastal sites that are being treated under the FRDA backlog reforestation program, and to make recommendations for further work.

From inquiries and interviews with industry and government foresters, it was determined that most of the coastal backlog reforestation projects were directed to rehabilitation of good-quality sites formerly occupied by Douglas-fir and now colonized by less-desirable hardwood tree species. Results of the recent B.C. Forest Service survey of root diseases in second-growth Douglas-fir in the Vancouver Forest Region indicated that these

sites commonly have 15% or more of the ground area with Douglas-fir trees infected by laminated root rot. An inspection of a few treatment areas and discussions with field workers confirmed that coastal backlog areas commonly had the root disease.

Developing site evaluation methods to determine the extent and hazard of root disease on each backlog area was investigated.

Two sites were examined in detail: one prior to and the other immediately after logging. Standing trees, windblown trees and exposed roots, old first-growth and second-growth stumps were examined for characteristic features of the root rot. Stumps were drilled with a powersaw auger, and the wood chips cultured for the fungus.

It was found that several features such as infected stumps can be used to estimate the extent of infestation on a site. However, the work at this preliminary stage was laborious and time-consuming. A more rapid survey will be developed in 1987, and workshops will be held with foresters and others to demonstrate the methods.

- J. Muir, Protection Branch, Victoria

Root Diseases in Interior Plantations and Backlog Areas (FRDA Backlog Research Project 3.8). The goal of the project was to develop suitable techniques to identify and treat root disease - infested backlog areas in the southern interior.

The approach taken was to determine the extent of root disease damage to young trees on representative sites, similar to those being treated under the FRDA backlog reforestation program. It was considered to be very difficult to determine whether a backlog site was infested due to the lack of susceptible host trees. Recently treated or replanted sites likely would not show evidence of the extent of root disease(s) for 5 to 15 years or more until young trees contacted all of the buried, infected roots, and developed symptoms of disease.

FRDA 3.8 research in 1985-86 assessed root disease occurrence and methodology in young stands. A method combining a strip tally of infected trees and plots for tree data was recommended, with some modifications for either armillaria or laminated root rot.

In 1986-87, seven backlog NSR areas and ten young stands in the ICHm1 subzone were examined. All areas except one had infected young trees, infected stumps, or infected, mature trees in adjacent stands. The incidence of young infected trees ranged from 0 to 6% in backlog areas, and 0 to 15% in the other young stands. One 35 year old stand of Douglas-fir and lodgepole pine had 60% of the trees infected.

These results substantiated the hypothesis that root diseases were common and damaging in backlog, NSR areas. Root diseases could result in, or exacerbate, backlog area, and therefore should be assessed when prescribing site treatments in southern interior forests.

From an evaluation of several means of evaluating root diseases on individual sites, it was determined that several hardwood shrub and tree species were infected and good indicators of armillaria root disease. The methods, species infected, and features to identify the root diseases were described and illustrated in a format suitable for a field manual.

Procedures and information for assessing root diseases in young trees during silviculture regeneration, free-to-grow and pre-spacing surveys were developed and reported in a separate project funded by FRDA Pest Control, provincial direct-delivery funds.

- J. Muir, Protection Branch, Victoria

Tomentosus Root Rot Update. A tomentosus root rot display, consisting of two 3 x 4 feet display boards, illustrating symptoms of the disease has been prepared. For more information contact Wayne Martin.

Tomentosus root rot incidence averaged 38% in a mixed spruce-aspen stand scheduled for a F.R.D.A. funded destumping trial this fall.

A pesticide application permit has been granted by the Ministry of Environment and Parks to apply Roundup® as a hack and squirt treatment to tomentosus infected spruce prior to logging. Gel caps (Pace Chemicals Ltd., Burnaby) will be used to inject Roundup into forty to fifty cm diameter spruce in July, a time when most of the chemical should move into the root system. The theory is that it may cause more rapid root decay and hence limit the spread of tomentosus root rot.

- W. Martin, Prince Rupert Forest Region, Smithers

Branch and Leader Dieback of Young Douglas-fir within the Cariboo Forest Region. A survey was completed in the winter of 1986-87 to determine the incidence of Sclerophoma spp. and Dermea pseudotsugae in young Douglas-fir stands within the Cariboo Forest Region. The results are as follows:

Stand Origin	Subzones	# of Stands Sampled	Area Sampled (ha)	% of Fd Infected ¹	% of Infected FD with Leader or Top Kill ²	% of Infected with Serious Form Defects ^{2,3}
Planted	ICHe, ICHh SBSc, SBSj	9	820	35.4	83.4	28.5
Natural	ICHh	1	34	20.8	98.3	26.6
Natural	IDFa, IDFb SBSa, SBSb	7	341	9.0	59.8	27.9
		17	1195	23.7	74.5	28.2

¹Includes attack by both Sclerophoma spp. and Dermea pseudotsugae.

²Percent based on the infected Douglas-fir only.

³Serious Form Defects defined as two or more leaders competing for dominance following attack.

As well, twenty (20) permanent sample plots were established in four (4) of the heavily infected stands to monitor the influence of the pathogens over time:

<u># of Stands</u>	<u>Fd Stems per ha</u>	<u>% Fd Infected</u>	<u>Fd Crop Trees/ha</u>
4	691	50.1	347

The survey results illustrate that Dermea pseudotsugae was of low incidence, but Sclerophoma spp. is a serious pathogen in second growth Douglas-fir stands within moist to wet biogeoclimatic subzones (ICHe, ICHh, SBSc and SBSj) in the Cariboo. Therefore, it is imperative that more studies be initiated to get a better understanding as to the biology of the pathogen, its incidence, and its impact on young Douglas-fir stands.

- D. Doidge, Cariboo Forest Region, Williams Lake

Mistletoe Reduces Volume of Lodgepole Pine by 30%. A pilot study investigating the impact of dwarf mistletoe on lodgepole pine volumes was conducted in 1987. A total of 79 trees, with an average age of 73 years, were felled and measured in a stand in which both healthy and infested individuals were growing. The trees were selected such that all DMR classifications were represented in the sample. Analysis showed a 30.5% volume difference between DMR 0 and 1 (healthy) and DMR 2-6 (infested) at a comparison age of 60 years. The results of this study on individual trees suggest a need for further study to determine losses on a whole stand basis.

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

White Pine Blister Rust Management Plan and Guidelines, Nelson Region. A preliminary draft was completed in cooperation with Kamloops Regional Pathologist. After detailed consultation with Silviculture and Timber and Valuation, a final draft will be ready by July 31, 1987.

- D. Norris, Nelson Forest Region, Nelson

Ecosystem - Inventory Link, Nelson Region. With assistance from the regional Research and Inventory Sections, conifer species in each of the ecosystem associations in the Nelson Region have been linked and assigned inventory site classes, based on the 1981 site tables. Now an estimate of site productivity degradation, attributable to a disease can be made. The reverse is also true. Disease problems have been discovered in those areas where a site class discrepancy between the inventory and ecosystem estimates have been found.

So far, in eight field visits, good and medium sites have been found reduced to poor and non-merchantable poor respectively. Causes have been identified as dwarf mistletoe, Armillaria, and black stain root rot. A comprehensive detailed test of this impact measurement method is being conducted this summer.

- D. Norris, Nelson Forest Region, Nelson

Spruce Cone Rust Control. Bayleton®, a new systemic fungicide, and Ferbam WDG®, a replacement product for Ferbam 76 WP®, were equally effective in reducing spruce cone rust infection at Skimikin Seed Orchards in 1986. Ferbam 76 WP was the candidate fungicide in a minor use proposal based on cooperative CFS-Forest Service trials in 1982-84, however, the product is being discontinued. The manufacturer requested that the new formulation (Ferbam WDG) be tested and hopes that all previous registration for Ferbam can be transferred to the new product.

A minor use proposal for Bayleton will be prepared in 1987-88 after one more year of efficacy work.

- D. Summers, Silviculture Branch, Victoria

New Forest Disease Handbook. Protection and other staff, especially in southern and northern interior B.C., will find a new publication helpful.

"Forest Tree Diseases of the Prairie Provinces" by Y. Hiratsuka outlines diseases and disorders of conifers and hardwoods. There are 47 pages of colour photographs and tables to distinguish the diseases and pathogens.

Copies of the Information Report NOR-X-286 are available on request from the Northern Forestry Centre, Canadian Forestry Service, 5320 - 122nd Street, Edmonton, Alberta, T6H 3S5.

- J. Muir, Protection Branch, Victoria

FOREST VEGETATION MANAGEMENT

Liability Insurance. Silviculture Branch has prepared a submission concerning liability insurance for herbicide projects. The proposal seeks approval to indemnify licensees from suits related to environmental impairment arising out of chemical application, where the licensee/contractor has complied with all laws, regulations, and conditions, relating to the handling and/or application of the chemical.

The submission must receive approval from several levels before coming into effect. Details will be announced as they become available.

- J. Boateng, Silviculture Branch, Victoria

Vegetation Management Survey. During August, 1986, a meeting was held in Smithers to discuss and field test various surveys for vegetation management. As a result of that meeting, a new survey form and procedures have been developed to obtain data on the target species.

The form is a revised Pre-Stand Tending Survey Form (FS 748) modified to include percent cover and height of herbaceous or shrub species. As the form could be used for surveys, prior to various stand tending treatments (e.g., juvenile spacing, brushing and weeding, conifer release, site rehabilitation, commercial thinning, etc.), the old form title will remain.

The forms and instruction package will be available shortly for field use this summer. Further revision may be required over the winter of 87/88 if deemed necessary.

- G. Ackerman, Silviculture Branch, Victoria

Manual Brush Control in the Cariboo. A report titled "An Assessment of Manual Brush Control in the Cariboo Forest Region" has been written by S. Perry, Stand Tending Forester, Cariboo Forest Region.

The report summarizes field assessments of seven projects and discusses not only efficacy (as related to target species and timing of treatment) but also costs, productivity, and expected duration of release.

Copies are available from Silviculture Branch, Victoria.

- G. Ackerman, Silviculture Branch, Victoria

Integrated Forest Resource FRDA Proposals. Numerous FRDA proposals have been received this year which involve the study of the impact of forestry practices on other forest resources. Four of these studies have received approval by the FRDA working group and appear to stand a good chance of management group approval as well. The titles approved by the FRDA working group are:

- development of tentative bioassay protocol for evaluating the risk to fisheries resources posed by forest-use pesticides;
- effect of glyphosate and other vegetation management treatments in the SBS zone on vegetation and forage resources in moose winter range;
- determination of threshold concentrations of forest-use herbicides causing rapid sub-lethal effects towards salmonid fish; and,
- preparation of an audio-visual educational training package for industrial and agency foresters and biologists that presents the various streamside silvicultural practices and the role and value of streamside vegetation to aquatic habitats. Wildlife habitat issues to be included in the A/V as well.

A fifth FRDA proposal concerning the evaluation of impacts of cattle grazing on forest regeneration also may be approved.

- J. Henigman, Protection Branch, Victoria

RANGE PEST MANAGEMENT

Biological Control of Knapweed. The purpose of this overview is to report a subset of the research activities related to knapweed biological control agents which have occurred to date in fiscal 1986/87.

In 1978 a program was begun at the Commonwealth Institute for Biological Control (CIBC) in Switzerland to assess the suitability of several root feeding insects for biological control of knapweed. Agapeta zoegana L. and Pelochrista medullana Stgr. were screened and approved for release in North America. Screening of the root weevil, Cyphocleonus achates, is nearing completion in Switzerland and approval for release is expected before the summer of 1987. Screening of a fourth insect, Pterolonche inspersa, was recently completed by the U.S. Department of Agriculture Laboratories and approval to release this insect in the U.S.A. and Canada was obtained in time to release this moth in July of 1986.

Successful direct field research and operational introduction and establishment of new insects appears to require a minimum of 200 individuals. Obtaining this number of moths and these root feeding insects from Europe has proven to be impossible for two reasons: (1) mortality and parasitism of the larvae shipped from Europe; and, (2) the knapweed habitats in Europe where these insects are found are small and are being destroyed by agriculture, forestry, and urban development. It would appear that the only option available to British Columbia is to propagate these insects in Canada.

It is anticipated that field propagation using cultivated knapweed under propagation cages would provide a method for optimizing the yield of these insects without the problems and costs of greenhouse propagation. If successful, the project could be scaled up at minimal extra cost. A similar project could also be used for operational release if interested land managers would maintain small knapweed plots.

In British Columbia, one of the emphases is to successfully propagate biological control agents. In cooperation with Dr. Peter Harris, Agriculture Canada in Saskatoon, and the Directors of Agriculture Canada Research Station at Kamloops, a simple but effective propagation system was set up on the Research Station at Kamloops. Kamloops was chosen because it is suitable for many of the knapweed biological control agents and because the Ministry of Forests and Lands has other range research in progress and coordinated with the Research Station under the supervision of Dr. Brian Wikeem.

One of the objectives was "to propagate A. zoegana, P. medullana and P. inspersa in British Columbia for subsequent field release." Agapeta zoegana was successfully propagated with an eightfold increase in numbers. A total of 436 female moths emerged at Kamloops and an additional 26 moths were imported

from Europe via Regina (CIBC) for propagation. These moths were used to populate ten propagation cages with the remaining 290 moths released at field sites. Eleven Pelochrista medullana and 87 Pteroclonche inspersa moths were also imported from Europe (via Regina) and released in propagation cages at Kamloops. A. zoegana and P. medullana larvae were found in the fall but no signs of P. inspersa larvae were observed.

The preceding information was taken directly from the draft of the report "Knapweed Containment and Control Program - Biological Control of Knapweed in British Columbia," Annual Report for the period April 10, 1985, to November 30, 1986. Plans for the 1987/88 fiscal year are currently being evaluated. Questions should be directed to Dr. Brian Wikeem, Research Branch, 3015 Ord Road, Kamloops, B.C., or Dr. Earl Jenson, Range Management Branch, Victoria, B.C.

- E. Jenson, Range Management Branch, Victoria

PESTICIDES

Aerial Spraying should be Discontinued. At the recent annual general meeting of the B.C. Wildlife Federation in Penticton, the membership voted strongly in favor of a discontinuation of aerial spraying. The resolution passed by the Federation is worded as follows:

WHEREAS the precise facts on the total effects that aerial spraying of herbicides or pesticides have on wildlife and wildlife habitat, including our inland fisheries are not known, and

WHEREAS aerial spraying is not fully controllable,

THEREFORE BE IT RESOLVED that aerial spraying of Crown lands with herbicides and/or pesticides for silviculture purposes, be discontinued until the ramifications of such spraying are fully determined.

Protection Branch staff present at the meeting defended aerial spraying as a viable and necessary option in forestry. However, Federation members were not convinced. We expect that Forest Service meetings with the Federation in the near future may clarify the situation.

- J. Henigman, Protection Branch, Victoria

Information Centres. The project to assemble key information on pesticide use and regulation in forest management has been completed. Collected in seven

volumes, the information is assembled to help balance discussion of technical facts, applications, and issues concerning human health and potential environmental impacts.

Residents near all Forest Service offices, in addition to staff and associates, are invited to use the reference documents, particularly to increase understanding of practices in British Columbia.

Suggestions for additional documents and comments on the utility of the Information Centre would be appreciated.

- R. DeBoo, Protection Branch, Victoria

Guidelines for Informing the Public About Proposed Herbicide Projects. A guideline report has been sent out to regional and district staff informing them of how best to inform the public of projects involving herbicides. This publication was completed by the Forest Service Forestry Issues Steering Committee. The report stresses pro-active public discussion and offers ways of maximizing communication. This document should help district staff, in particular, who are initiating programs involving herbicides. Recommendations are also made for situations where portions of the public have previously become antagonized against the use of herbicides. The report is available from the B.C. Ministry of Forests and Lands, Public Affairs Branch, Victoria.

- J. Henigman, Protection Branch, Victoria

Pesticides in Forest and Range Management. A new 14 page booklet summarizing the use of pesticides in forest and range management is now available. This publication is a revised edition of the previous publication entitled "Pesticides in Forest Management." The new edition offers updated pesticide use information. Sections on biological control and on the economics of pesticide use have been added. Copies of the publication can be provided from the Public Affairs Branch, B.C. Ministry of Forests and Lands, Victoria.

- J. Henigman, Protection Branch, Victoria

Regional Storage and Transportation Procedures. Safety and control will be emphasized in new regional storage and transportation procedures involving pesticides at regional storage facilities. We have slightly modified the procedures developed by Silviculture, Nelson Region, and will implement them during the summer of 1987. They essentially involve a solid paper trail and double signatures for each shipment from and to a regional facility. Districts are to implement similar procedures for their facilities.

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

Project Manager Training. The Pesticide Regulation and Use Policy requires Project Managers to be designated for each project involving pesticides. It also states that before a person can be "designated," that person must have participated in a similar project. Toward that end, the Prince Rupert Regional Protection and Silviculture Sections have and are continuing to develop a Project Manager's "Certification" Course. This course, initiated in 1985 to cover aerial applications, will be expanded in 1987 to include Velpar-L ground applications. Course duration will be two days and it will consist of three main parts:

- Office session - review in detail a Project Manager's responsibilities and duties during treatment;
- field session - participate in a similar operation; and,
- exam

Currently "certified" Project Managers' names are kept on file at the regional office.

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

Velpar® Report and Use Guidelines. An internal Forest Service Report, #PM-PR-9, entitled "Preliminary Observations of Velpar-L Movement within the Prince Rupert Forest Region" is now available. The report summarizes the use and potential for movement of Velpar on forest sites within the Prince Rupert Region. The information in the report has allowed the development of guidelines for Velpar use which should be practical to forester's objectives while minimizing the likelihood of environmentally damaging movement. The guidelines for use are included with the report. Copies of the report are available from Mike Geisler or Fred Newhouse, Prince Rupert Forest Region, Smithers, B.C.

- J. Henigman, Protection Branch, Victoria

Roundup® now Vision®. Monsanto Canada Inc. has changed the name of Roundup herbicide for forestry. The name Roundup shall be retained for the agriculture sector. The new forestry name is Vision.

Vision is exactly the same herbicide formulation of glyphosate as Roundup. Monsanto suggests that, in the future, they may alter the surfactant in Vision to make the herbicide more specifically compatible to forestry use.

In compliance with federal law, Vision herbicide has a new Pest Control Products number, which is 19899. Information on Vision is available from Protection or Silviculture Branches in Victoria or from any Monsanto Canada Inc. Office.

- J. Henigman, Protection Branch, Victoria

Proposed Herbicide Use. To the middle of April, 1987, the following data summarizes the number of hectares of forest land applied for in 1987 to be treated with herbicide under pesticide permit in some manner over the next three years. History has shown that about one-third or less of the hectares under permit actually receive a herbicide treatment in any one year.

Over the next three years, starting in 1987, proposals are:

Agency	Area (ha)	Application Method			
		Ground		Aerial	
		Individual Tree Trtmnt.	Spray	Fixed Wing	Rotary Wing
Forest Service	42 800	33%	44%	6%	17%
Industry	80 900	51%	14%	19%	16%

- J. Henigman and P. Humphreys, Protection Branch, Victoria

Dursban® 4E Registered for Pine Beetle. Dursban 4E (chlorpyrifos) has now been registered under the Minor Use Registration Program for use against mountain pine beetle. This will allow infested trees to be treated shortly before expected adult emergence. This treatment, and others, will allow single tree treatment to continue when fall and burn is impractical due to fire hazard.

- J. Henigman, Protection Branch, Victoria

1986 Gypsy Moth and Western Spruce Budworm - Kromekote® Card Assessment from Aerial Spray Applications. Droplet size and density measurements from the 1986 gypsy moth and western spruce budworm aerial sprays have been provided in a Saskatchewan Research Council report entitled An assessment of Kromekote card deposits from aerial spray applications. The spray pattern from three nozzle combinations, D7-45, D2-13 and Micronair® AU 4000, were assessed under various spray conditions. The best overall spray deposit was produced from the Micronair AU 4000 nozzles operated under conditions that favoured low-moderate evaporation and drift.

This report includes a literature review of deposit requirements and optimal weather conditions for insecticide sprays and a number of recommendations, including:

1. the frequency of drop deposition should be > 20 droplets/cm² in open field calibration tests to ensure proper coverage. The spray should have a VMP of approximately 100 mm which balances the effects of drift and proper size of insect coverage; and,
2. the limit of detection could be lowered from 50 mm to 25 mm if water-sensitive deposit paper was used. A stronger rhodamine dye solution or water-sensitive paper should be used to produce more distinct images.

In 1987, two additional assessment techniques will be investigated including water-sensitive cards and chemical analysis of foliage.

- S. Taylor, Protection Branch, Victoria

Proposed Pesticide Use 1987/88. Internal report PM-PB-27, entitled "Proposed Pesticide Use on Crown Forest Land, 1987/88" by P. Humphreys and G. Ackerman, will be published in May. This report summarizes data supplied by the Ministry of Forests and Lands Regional Offices on planned Ministry and forest industry activities involving pesticides. Included are summary tables of areas scheduled for treatment by purpose, method, and pesticides used, as well as a breakdown of this information by each forest region and forest district.

During the 1987/88 fiscal year, over 50 000 ha are proposed for treatment by Ministry and industry personnel. This represents a potential 100% increase over the previous year, yet only 0.1% of the total Crown forest land base could receive pesticide treatment during the 1987/88 fiscal year. Of the total area proposed for treatment, approximately 1 000 ha (2%) will be treated for the purpose of range weed control, approximately 1 200 ha (2%) for insect control, and the remaining 48 500 ha (96%) are scheduled to be treated with herbicides for vegetation control.

- P. Humphreys, 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, 387-1191
J. (Jacob) Boateng, Brushing and Weeding Specialist, Victoria, 387-1191
G. (Gord) Ackerman, Technician-Stand Tending, Victoria, 387-1191
D. (Don) Summers, Seed Production Pest Management Officer, Victoria, 387-1191
B. (Bev) McEntire, Seed Production Pest Management Technician, Victoria, 387-1191
G.M. (Gwen) Shrimpton, Nursery Pest Biologist, Surrey Nursery, 576-9161

Cariboo Forest Region

Region Staff

D.F. (Don) Doidge, Pest Management Coordinator, Williams Lake, 398-4442
(Vacant), Forest Entomologist, Williams Lake, 398-4437
W.D. (Wes) Mussio, Appraisal Coordinator, Williams Lake, 398-4444
J. (Jane) Perry, Stand Tending Coordinator, Williams Lake, 398-4400
S. (Sandy) Latins, Range Weed Coordinator, Williams Lake, 398-4394

District Staff

S.D. (Stan) Harvey, District Pest Management Coordinator, Quesnel, 992-4383
J.R. (John) Bradley, District Pest Management Coordinator, Williams Lake, 398-4330
D.R. (Derek) Poole, District Pest Management Coordinator, Horsefly, 620-3327
R. (Robin) Fennel, District Pest Management Coordinator, 100 Mile House, 395-3812 or 459-2522 (Clinton)
R. (Richard) McKay, Resource Officer-Protection, Alexis Creek, 394-4215

Kamloops Forest Region

Region Staff

R. (Ron) Edward, Pest Management Coordinator, Kamloops, 828-4178
L. (Lorraine) MacLaughlin, Forest Entomologist, Kamloops, 828-4177
H. (Hadrian) Merler, Forest Pathologist, Kamloops, 828-4176
R. (Ron) Gray, Stand Tending Coordinator, Kamloops, 828-4163
J.L. (John) Pethybridge, Range Weed Coordinator, Kamloops, 828-4582

District Staff

K. (Ken) Smith, Pest Management Technician, Kamloops, 372-5832
A. (Art) Newman, Pest Management Technician, Kamloops, 372-5832
E. (Eric) Haupt, Pest Management Officer, Vernon, 542-0264
W. (Wayne) Langlois, Pest Management Officer, Salmon Arm, 832-7153
B. (Bob) Read, Resource Officer-Protection, Clearwater, 674-2265
J. (Jim) Mottishaw, Protection Technician, Penticton, 492-8271
T. (Tom) Lacey, Resource Officer-Protection, Merritt, 378-9311
T. (Tim) Van Horlich, Pest Management Technician, Lillooet, 256-7531

Nelson Forest Region

Region Staff

E. (Ernie) Morris, Pest Management Specialist, Nelson, 354-6144
D. (Don) Norris, Regional Forest Pathologist, Nelson, 354-6149

District Staff

S. (Steve) Byford, Pest Management Officer, Cranbrook, 426-3391
E. (Emile) Begin, Pest Management Officer, Invermere, 342-9257
L. (Larry) Hewlett, Resource Officer-Protection, Golden, 344-5991
A. (Archie) McConnachie, Resource Officer-Protection, Revelstoke, 837-7611
D. (Dan) Reiben, Pest Management Officer, Arrow, 365-2131
B. (Ben) Zuber, Pest Management Officer, Boundary, 442-5411
M. (Mike) Pascuzzo, Pest Management Officer, Kootenay Lake, 825-4415

Prince George Forest Region

Region Staff

R.D. (Russ) Cozens, Pest Management Forester, Prince George, 565-6119
R.S. (Bob) Hodgkinson, Forest Entomologist, Prince George, 565-6122
G.A. (Gord) Ensworth, Surveys and Detection Forester, Prince George, 565-6123
G.B. (Bruce) Pamplin, Stand Tending Forester, Prince George, 565-6179

District Staff

F.L. (Fred) Turner, Resource Officer-Protection, Prince George West, 564-6634
B.L. (Bruce) Doerksen, Resource Assistant-Protection, Prince George West, 565-6281
G.E. (Gerry) Magee, Resource Officer-Protection, Prince George East, 562-4121
L.M. (Larry) Johnson, Resource Assistant-Protection, Prince George East, 562-4121
R.G. (Roger) Wiltsie, Resource Officer-Protection, McBride, 569-2265

A.D. (Dale) Cinnamon, Resource Assistant-Protection, McBride, 569-2265
M.F. (Mike) Dittaro, Acting Resource Officer-Protection, Vanderhoof, 567-9281
J.R. (Bob) Harlow, Resource Assistant-Protection, Ft. St. James, 996-7131
J.A. (John) Reid, Resource Officer-Protection, Ft. St. James, 996-7131
M.J. (Martin) Elphee, Resource Assistant-Protection, Ft. St. James, 996-7131
A.R. (Al) Kneeland, Resource Officer-Protection, Mackenzie, 997-3310
P. (Paul) Gevatkoff, Resource Officer-Protection, Dawson Creek, 784-2350
W.O. (Walter) Johnston, Resource Officer-Protection, Ft. St. John, 785-8177
R.E. (Roy) Simpson, Resource Officer-Protection, Ft. Nelson, 774-3936
G.H. (Gerry) Vanderkwaak, Resource Assistant-Protection, Ft. Nelson, 774-3936

Prince Rupert Forest Region

Region Staff

M. (Mike) Geisler, Pest Management Coordinator, Smithers, 847-7477
T. (Tim) Ebata, Forest Entomologist, Smithers, 847-7479
W. (Wayne) Martin, Forest Pathologist, Smithers, 847-7478
F. (Fred) Newhouse, Stand Tending Coordinator, Smithers, 847-7514

District Staff

W.F. (Bill) Davidson, Resource Officer-Protection, Burns Lake, 692-2223
K. (Ken) Brahniuk, Resource Officer-Protection, Houston, 845-6211
B. (Bruce) Hutchinson, Resource Officer-Protection, Smithers, 847-7555
N.J.L. (Nils) Anderson, Resource Officer-Protection, Hazelton, 842-6581
J. (Joe) Katsanoff, Resource Officer-Protection, Terrace, 638-3290
W.T.S. (Bill) Jackson, Resource Officer-Protection, Prince Rupert, 627-0460
B. (Brian) Simpson, Resource Officer-Protection, Queen Charlotte City, 559-8447
W.D. (Bill) Harvie, Resource Officer-Protection, Dease Lake, 771-4141
R. (Robert) Krause, Protection Resource Technician, Burns Lake, 692-2223
K. (Ken) Bush, Resource Assistant-Protection, Smithers, 847-7555

Vancouver Forest Region

Region Staff

R. (Dick) Heath, Pest Management Coordinator, Burnaby, 660-7655
D.G. (Don) Heppner, Specialist-Forest Entomology, Burnaby, 660-7653
J.D. (Jeff) Beale, Specialist-Forest Pathology, Burnaby, 660-7654
M. (Mel) Scott, Stand Tending Coordinator, Burnaby, 660-7579

District Staff

D. (Dave) Hames, Resource Officer-Protection, Chilliwack, 794-3361
R. (Richard) Saunders, Resource Assistant-Protection, Chilliwack, 794-3361
G. (Greg) Hemphill, Resource Officer-Protection, Sechelt, 885-5174

B. (Barry) Miller, Resource Officer-Protection, Powell River, 485-9831
R. (Ron) Diprose, Resource Assistant-Protection, Powell River, 485-9831
W. (Bill) Loughheed, Resource Assistant-Protection, Duncan, 746-5123
D. (Dan) Powell, Resource Officer-Protection, Port Alberni, 724-9205
A. (Al) Cottoni, Resource Assistant-Protection, Port Alberni, 724-9205
S. (Steven) Schmidt, Resource Officer-Protection, Campbell River, 286-3282
W. (Bill) Hardy, Resource Assistant-Protection, Campbell River, 286-3282
S. (Stan) Gripich, Resource Officer-Protection, Port McNeill, 956-4416
D. (Denis) Tippie, Resource Officer-Protection, Mid-Coast, 982-2621
B. (Brian) Simpson, Resource Officer-Protection, Queen Charlotte Islands, 559-8447

MEETINGS

Western Forest Disease Work Conference, 1987. The 35th Western International Forest Disease Work Conference will be held August 17-21 at the Coast Bastion Inn, Nanaimo. The conference is a structured but informal workshop on forest disease research and management, both for scientists and those engaged in pest management activities.

Topics include a workshop on canker fungi by Dr. Al Funk, update reports by pest management and research institutions in western North America, a workshop on the new PROGNOSIS root disease model, and discussion sessions on root diseases, dwarf mistletoes, stem rusts, and control treatments. A field trip during the conference and post-conference tours in southwestern B.C. are planned. Participants also are invited to submit posters.

Copies of the agenda and hotel registration applications are available from the Regional Forest Pathologist. Copies of previous proceedings are available, at cost, from K. Russell, Department of Natural Resources, Olympia, Washington.

- J. Muir, Protection Branch, Victoria

Western Forest Insect Work Conference. The 1987 conference was held in Park City, Utah. It was attended by approximately 100 forest entomologists representing a variety of Canadian and American agencies and universities. The "theme" of part of the conference was "High Tech in Pest Management" and included discussions on remote sensing, information systems, and the potential of artificial intelligence and expert systems. A summary of the conference has been circulated to the regions. The 1988 meeting of the WFIWC is planned for the first week of March in Flagstaff, Arizona.

- P. Hall, Protection Branch, Victoria

ACAFA Symposium. The National Research Council's Associate Committee on Agricultural and Forestry Aviation will sponsor a symposium on aerial application of pesticides in forestry in Ottawa, October 20-22, 1987. Experts from across Canada and the U.S.A. will discuss principles of spray droplet formation, spray cloud behaviour, spray cloud measurement and assessment, modelling of spray cloud behaviour, and various operational considerations.

For further information, please contact the undersigned or write to:

Mr. K. Charbonneau
Head, Conference Services
National Research Council Canada
Montreal Road
Ottawa, Ontario K1A 0R6

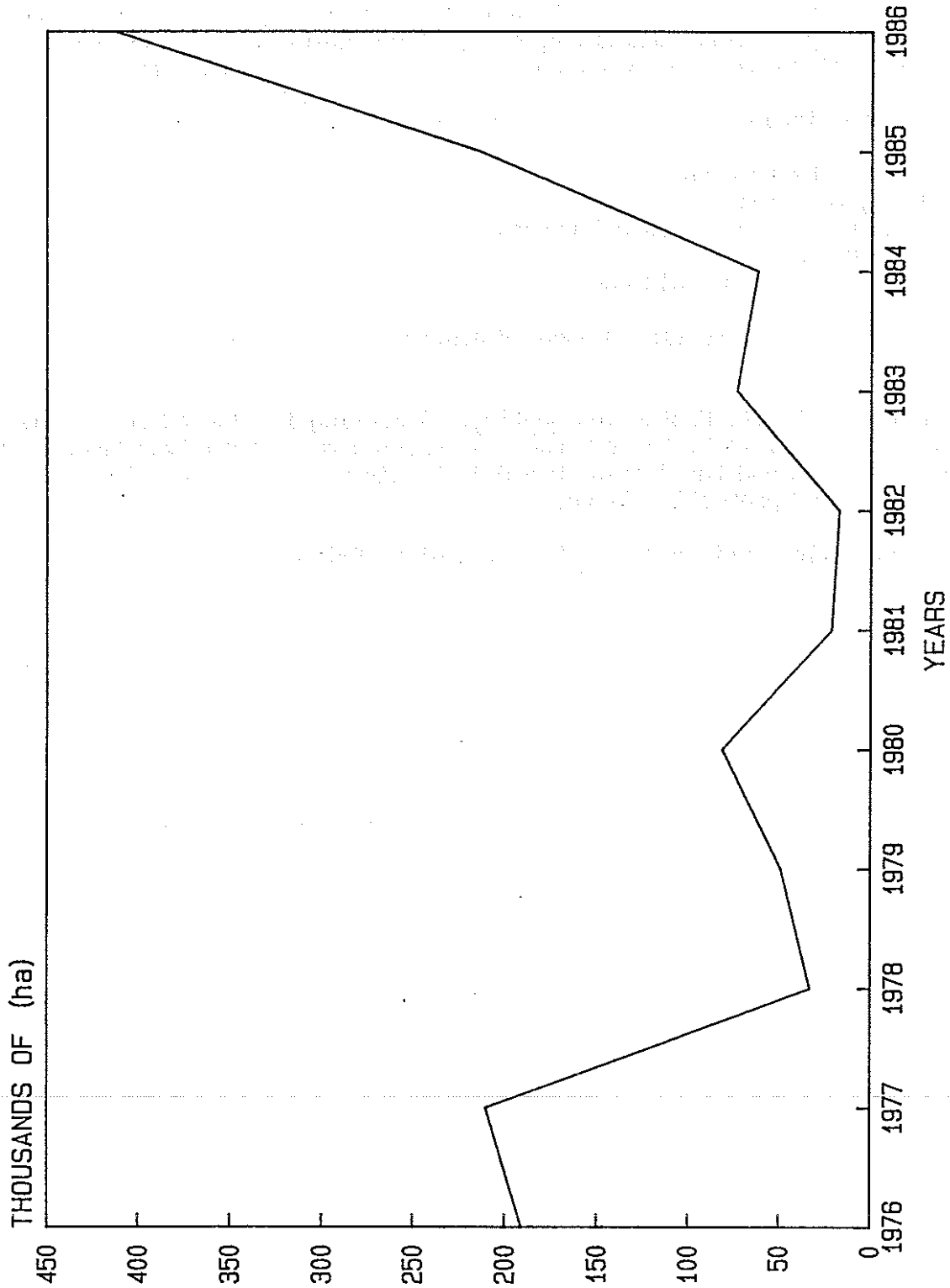
- R. DeBoo, Protection Branch, Victoria

Joint Canada-U.S.A. Protection Meeting. A meeting is planned for the last week of May 1987 in Smithers between protection representatives from the B.C. Forest Service and the Alaska, U.S.D.A. to discuss and review, in the field, current shared protection issues.

- A. Gorley, Prince Rupert Forest Region, Smithers

TABULATIONS AND GRAPHICS

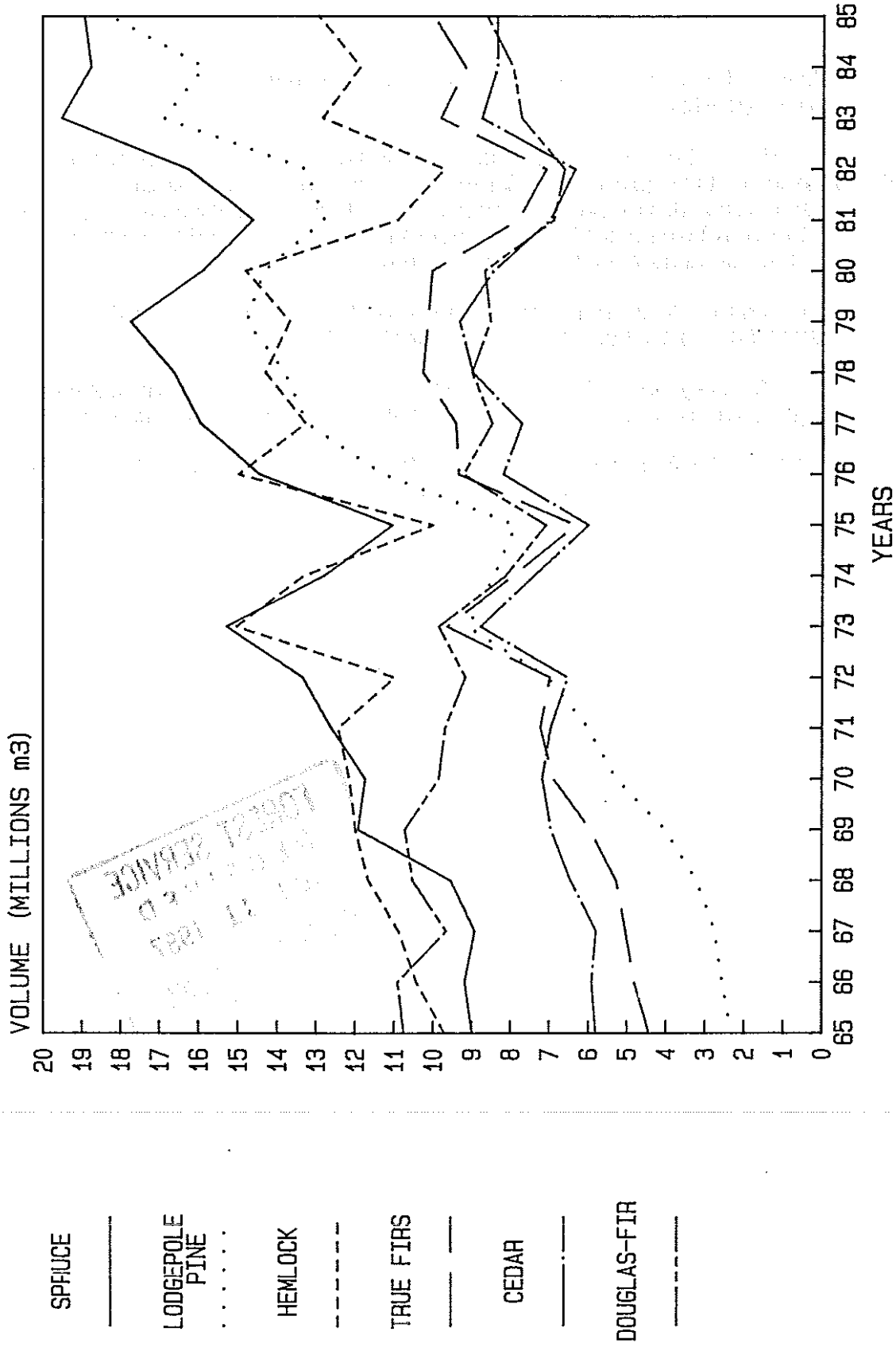
**TRENDS IN VISIBLE DEFOLIATION OF DOUGLAS-FIR
CAUSED BY THE WESTERN SPRUCE BUDWORM IN
BRITISH COLUMBIA (YEARS 1976-1986)**



Source: CFS (FIDS)

- Prepared by P. Humphreys, Protection Branch, Victoria

TRENDS IN SPECIES CUT IN BRITISH COLUMBIA 1985-1985 (CALENDAR YEAR)



- Prepared by P. Humphreys, Protection Branch, Victoria

PUBLICATIONS AND REPORTS

B.C. Ministry of Forests and Lands. 1987. Pesticides in Forest and Range Management (Revision). ISBN 0-7718-8566-0, 14 pp.

DeBoo, R.F. 1987. Understanding the gypsy moth threat in British Columbia: Developing a strategic plan. In Proc. of an Inf. Symp. held 5 November 1985 at the Robson Square Media Centre in Vancouver sponsored by the British Columbia Plant Protection Advisory Council, Agriculture Canada, New Westminster, B.C., pp. 59-66.

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