Province of
British Columbia
Ministry of
Forests

PEST MANAGEMENT PROGRESS

FOREST SERVICE
JAN 9 1984
VANCOUVER OFFICE

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

Volume II, Number 2 (File: 190-4 PMP) ISSN 0714-1610 November, 1983

WEATHERING THE STORM

Restraint measures, resulting in part from reduced revenues, have severely affected many forest pest management projects across the Province. High priority pest detection, assessment and control initiatives have been curtailed along with many other forestry activities since announcements were made last summer. Of particular concern has been the loss of experienced field staff. We request all managers to direct funding to pest management in line with the priorities required to prevent or reduce our current pest-caused losses. We cannot afford to lose local specialists and their enthusiastic and energetic devotion to pest management. Protection from insects, diseases and weeds in our forests and rangelands is one of the most important functions of our Ministry, and we must ensure that resources are made available to maintain commitments of the Ministry in the production of wood fibre and forage.

With major cutbacks in program and support personnel now basically accomplished, remaining Forest Service staff will be working to develop revised approaches and objectives in pest management. Foremost amongst these must be the development of comprehensive pest management plans for the administration of the Province's 33 Timber Supply Areas. Many of these areas either are being depleted at alarming rates or may not reach productivity target levels due to pest attack. Realistic pest management plans must frame major initiatives to ensure projected wood supplies. These plans should also confirm the Ministry's commitment to pest management.

"Pest Management Progress" is intended to respond to the annual forest insect and disease survey report of the Canadian Forestry Service. In other words, PMP is an important vehicle to signal the direction and scope of the Ministry's activities which may result from reports of forest pest distribution or damage. This biannual report also is intended to focus on other pest management activities resulting from independent Ministry prerequisites. We believe much can be accomplished within the constraints imposed given the chance to participate. Bear with us as we regroup to assert progressive pest management in British Columbia.

- R.F. DeBoo, Protection Branch, Victoria

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PEST MANAGEMENT PROGRESS

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Publisher's and Editor's Note:

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

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

PEST MANAGEMENT GENERAL

Reviews of Regional Pest Management Programs. Four comprehensive reviews intended to ensure the integrity and direction of pest management programs and plans were completed in 1982-83 at Burnaby, Prince George, Williams Lake and Nelson. Discussions included requirements as perceived by both Regional and Protection Branch staff. A common goal and direction of effort were revealed. Several areas for improvement were noted including communication and collaboration. The importance of operational guidelines was stressed.

Similar sessions at Smithers and Kamloops are anticipated before April 1984. It is expected that this review procedure will be improved and become an annual pest management activity across the Province.

- H.G. Doerksen and R.F. DeBoo, Protection Branch, Victoria

Development of Pest Management Policy. Final review of the Ministry's comprehensive draft policy for the administration of pest management programs should be completed in December. Policy development has been particularly difficult because of the historical separation of pest management roles and responsibilities among several Branches and specialty groups at Regional and District offices. After nearly two years in preparation, most concerns appear to have been addressed. Hopefully, the Ministry will soon have a foundation document to support forest and range pest management initiatives across B.C.

- R. DeBoo, Protection Branch, Victoria

Pest Management Guidelines. Substantial progress on the preparation of comprehensive background-operational guidelines has been made during recent months. Penultimate drafts for root diseases, bark beetles and dwarf mistletoes have been prepared. These guidelines will appear as chapters of Volume II (Pest Management) of an extensively revised Protection Manual. Targeted publication date is spring, 1984.

- R. DeBoo, Protection Branch, Victoria

TSA Pest Management Planning. In response to concerns of the Chief Forester, Ministry of Forests, about the limited extent of pest management plans in the Ministry Timber Supply Area (TSA) plans, Branch and Regional Planning and Pest Management staff developed information and procedures which identify effects of pests on timber supplies and incorporate them into the TSA planning process. Essentially, these comprise:

1. A review of existing TSA plans, particularly pest management content.

2. Development of a pest management information format for TSA planning which:
   (a) Identifies potential pest activity by forest inventory type and by age classes.
   (b) Estimates potential losses due to current and probable future pest activities.

(c) Estimates potential savings or enhancement which could be achieved through pest management.
(d) Facilitates formulation of pest management proposals for each TSA according to alternate production targets.

3. Incorporation of specific pest management proposals into second-round TSA plans.

Work is now underway to complete the format for each TSA. Initial presentation and reviews are scheduled for the December 1983 meeting of the Forest Pest Review Committee.

- J. Bullen, Planning Branch, Victoria, and D. Ross, Protection Branch, Victoria

Slide-tape and Films. Revisions of existing slide-tape presentations and development of new packages are planned or were undertaken. These include:

- mistletoe (revision)
- root disease (new)
- pest management (new)
- forestry pesticides (new)
- mountain pine beetle (review)

- P. Hall, J. Henigman, J. Muir and S. Taylor, Protection Branch, Victoria

Smoke as a Pest Control Agent. It was suspected that wood smoke in forests, in some cases, had an adverse effect on insect larvae. For example, on June 16, 1983, a small 1.5 ha fire (Dew fire 02/026) occurred at Tranquille near Kamloops, B.C., in an area heavily infested with Douglas-fir tussock moth (DFTM). The fire was quickly contained. Crews conducting control and mop-up complained to the fire boss about the excessive numbers of DFTM moving from the trees to ground which, to some degree, hampered fire control action because the larvae caused some discomfort to fire fighters.

On June 29, 1983, members of the Protection Branch (Pest and Fire Management) and Kamloops Regional office conducted smoke trials on an area immediately adjacent to the Dew fire. The objective was to determine if natural wood smoke has a significant adverse effect on DFTM larvae. If so, smoke might be used by residents in infested areas as a relatively inexpensive and non-chemical method of control.

Large (200 litre) drums were used as burners. Natural green vegetation (juniper, sage brush, fir branches, etc.) was used as fuel. Combustion was minimized to ensure a maximum amount of smoke. Ground sheets were spread under the trees and as larvae dropped from standing trees, counts were made at 5 minute intervals up to a maximum of 15 minutes.

Several problems were encountered during the trials. Although wind conditions were stable, it was impossible to contain the smoke in tree crowns, which were

an estimated 15 meters height, for even a few minutes due to convection. Smoke quality was difficult to maintain and smoke was not consistently thick.

Even when sufficient smoke was applied to several individual larvae for up to 20 minutes, we observed no apparent adverse effect. In one instance we applied excessive heat (est. 80° C) combined with a minimum amount of smoke to a 5 meter tree. Disturbance and subsequent mortality to larvae were judged significant, but it seemed likely that the tree would be killed too.

We concluded that natural wood smoke applied to Douglas-fir trees infested with DFTM would not effectively control tussock moth larvae on single trees or on small groups. The high mortality of larvae on surviving trees that occurred after the Dew fire apparently was caused by excessive heat, not smoke.

- V. Bate, Protection Branch, Victoria

Kamloops Region Activities. District and Region staff cuts severely curtailed or suspended many pest management activities. At this time only a brief summary statement about recent activities can be made.

Operations in response to spruce and mountain pine beetle infestations are estimated in the supplementary table in the Table and Graphics Section (p. 46).

In addition to coordinating the grant-in-aid program, Douglas-fir tussock moth control activities included operational trials of NP virus, Sevin® and Bacillus thuringiensis, and evaluation of NP virus trials at Veasy Lake which appeared very successful. Details will be reported in cooperation with Protection Branch. The fall egg mass survey was completed and populations have collapsed in all but two areas. Egg collections were made for Pacific Forest Research Centre to determine incidence of viral infection.

Pheromone baiting for Douglas-fir beetle was conducted in three areas. Results were encouraging. Pheromone baiting for mountain pine beetle was conducted in cooperation with Dr. John Borden, S.F.U., to contain beetles in areas scheduled for harvest. Pheromone baiting of spruce beetle trap trees also was carried out. However, the spruce beetle program results were lost because staff cuts did not permit evaluation in the field.

A white pine pruning project to control blister rust was undertaken in the Clearwater District under the New Employment Expansion and Development Program. Field training in identification and management of root rots was provided to both industry and Ministry staff.

Pest management plans for Timber Supply Areas are in progress. Approximately twenty more activities were initiated but were suspended due to restraint.

- R. Edward, Kamloops Forest Region, Kamloops

Suggestions for Economic Analyses of Pest Impacts. The following is intended as "food for thought" for those considering the economic impacts of pests. It is neither a strict set of guidelines nor a complete list of "everything you need to know but were afraid to ask."

Reduction of losses due to pests is the main concern of pest management. To ensure that this is done economically raises the question: Where can money be spent in a way that produces the greatest worthwhile results? Answering this question requires knowledge of:

(a) where management is possible,
(b) how much the application of control measures will cost, and
(c) what the estimated effect on the productivity of the forest resource will be

The main concern of an economic analysis is to determine whether the value of effects on the resource justifies the expense of control measures. The differences between the estimated future resource without and with control measures must be determined. These can then be assigned a value which can be compared with the cost of control measures.

Several difficulties often arise in determining the effect on the resource:

1. Estimating the reduction in pest losses requires consideration of both the resources involved and the probability (risk) that the pest outbreak will occur.

2. Quantification is difficult because the losses occur over areas and at various intensities, and both are estimated with varying degrees of precision. To avoid misunderstandings, significant assumptions and facts must be stated. For example, if Douglas-fir tussock moth infests 100 ha and kills 90% of its host, it is also important to know what percentage of the forest canopy consists of the host. Similarly, the statistical precision of estimates should be stated, especially for estimated probabilities of losses with and without control measures.

Finally, a systematic presentation of the scope of a pest problem is helpful in assessing its importance. This requires overviews from several perspectives:

1. How much of a Timber Supply Area or Forest Region is involved? This can be shown in terms of areas and volumes (by species, preferably).

2. Losses due to pests are perceived according to land ownership, size of land parcels and main use of the land. A breakdown of Crown and private lands is therefore useful. Losses on private land may be in terms of the value of property and improvements, the use of which is affected, rather than in terms of timber value.

3. Aside from losses of timber, other forest resources such as recreation may also suffer, though these losses are usually less significant. Even without extensive surveys, it should be possible to make subjective assessments of these potential losses. These assessments could indicate whether or not more information is desirable.

- T. Niemann, Strategic Studies Branch, Victoria

EBAP and NEED Pest Management Projects. Several projects involving pest management were completed in the Employment Bridging Assistance Program (EBAP) and New Economic Expansion Development (NEED) program. They were sponsored by several industrial and other organizations, and usually included some participation by Ministry staff. Projects included pest surveys and appraisals, thinning, pruning and other activities. At the time of this report, several more 1983-84 EBAP pest management and research projects are planned. For details contact the Regional Silviculture Officer.

- J. Muir, Protection Branch, Victoria

U.B.C. Forestry Theses on Pest Management. In cooperation with Vancouver Region, two University of B.C. forestry students have undertaken bachelor of science in forestry theses on local pest management topics.

Alan Blattler is examining the potential use of western white pine as a species to plant in root disease pockets to decrease disease and increase yield of second-growth stands. Control of root disease is probably the largest opportunity for pest management in the Region.

Jeff Fournier is studying a potential Douglas-fir beetle outbreak in the area of the Aug fire at Strathcona Provincial Park on Vancouver Island.

- P. Wood, Vancouver Forest Region, Burnaby

Pre-Harvest Silviculture Assessment and Pest Management. Faced with a growing concern over productive area lost and site degradation incurred due to poorly planned and executed logging operations, particularly in the face of predicted wood shortages, Silviculture Branch has developed a Provincial pre-harvest silviculture assessment to help reduce such losses and degradation.

By examining an area prior to logging and considering numerous factors including soil types and depths, topography, natural regeneration, undergrowth, pathological indicators and productivity of the existing stand, prescriptions can be developed for logging operations and subsequent reforestation. These should minimize loss of productive areas and site degradation, leave the site in better condition for reforestation, reduce problems with brush and provide for measures against forest pests.

Regions field-tested the pre-harvest silviculture assessment during 1983. Jim Simpson, forestry instructor at B.C. Institute of Technology, on contract to Silviculture Branch, is examining administrative details. Some modifications to the data collection and summary processes will be made as a result of the field tests and a revised assessment program will be in place for the 1984 field season.

The protection aspects of this program are two-fold. During the assessment information on pests such as root rots, bark beetles, defoliators and dwarf mistletoe are gathered so that prescriptions for harvest or reforestation can be modified to avoid potential problems. This information will be referred to Protection staff so that their expertise can assist Silviculture staff in developing the most appropriate treatment measures.

The other aspect of the process is that Protection, through its own surveys, has knowledge of pest occurrences and can forecast the likelihood of problems arising, such as areas prone to infestation by leader weevils. Although we are just in the formative stages, the framework is being established for what might well be termed a preventive maintenance program against forest pests in new managed forests.

- P. Diggle, Silviculture Branch, Victoria

FOREST ENTOMOLOGY

Rapattack Pest Management. In 1982 a seven-man crew trained to rappel from helicopters for fire suppression undertook pest management projects from March until May 15, and continued as the fire season permitted to August 31. Rapattack crews worked throughout southern, central and north central British Columbia, mostly on mountain pine beetle and spruce beetle infestations.

Several helicopter landing areas (helipads) were cleared to provide access to large mountain pine beetle infestations. In small infestations, recently infested trees were felled and burned.

In spruce beetle infestations, crews felled suitable spruce trees for trap trees which were later removed or burned. Crews also rappelled into remote areas and conducted probes for possible infestation during the walk out to predetermined pick-up points.

In 1983, due to the provincial fiscal restraint program, Rapattack crews did not commence pest management programs prior to the fire season. However, with an unusually damp summer which resulted in 1000 fewer fires than average (2500), Rapattack crews completed some pest management work in the Prince George and Kamloops Forest Regions.

Summary of Rapattack Pest Management Activities

Year	Probes	Helipads	Trap Trees	Infested Trees Felled and/or Burned
1982	25	49	583	210
1983	*3	21	-	1
Total	28	70	583	211

Note: *These 3 probes were in very large areas requiring 47 man-days labour. Also, 9 man days were spent piling previously (5 yr. old) cut mistletoe slash for fire hazard reduction.

Because of the major insect problems in British Columbia, the effects of Rapattack pest management are not yet apparent in the second year of operation. However, Rapattack pest management should be very useful for access to normally inaccessible areas, for site-specific evaluations and control operations.

Protection Branch is currently analyzing opportunities and preparing a 1984 program to priorize and optimize Rapattack activities in British Columbia as a component of forest pest management.

- S. Kemmler, Protection Branch, Victoria

Mountain Pine Beetle Pheromone Operational Trials. Approximately 1100 mountain-pine-beetle-attractant pheromone baits were distributed by District and Regional staff in Prince Rupert, Kamloops and Nelson Forest Regions for operational trials. Pheromones were used to monitor beetle flight periods to contain infestations by limiting dispersal and to aid in "mopping-up" of single infested trees. These trials have been assessed and reports will be prepared prior to the next field season.

Mountain pine beetle pheromone is available commercially and details are available from Protection Branch. Discussions are continuing with suppliers to develop a less expensive product.

- P. Hall, Protection Branch, Victoria

Cariboo Aerial Insect Surveys. Results of the 1983 aerial survey are presented in the tables below. All figures describe losses in mature timber. Bark beetle losses represent red-top trees attacked within the last several years.

Bark Beetle Losses

	1982 Infested (ha)	1982 Lost (m^3)		1983 Infested (ha)
Spruce	12,200	789,000	Spruce	3,480
Douglas-fir	18,000	212,000	Douglas-fir	21,100
Pine	287,000	3,120,000	Pine	379,000
Total	313,000	4,120,000	Sub-total	403,580
			Balsam	398
			Grand Total	403,978

Defoliators

	1982 Infested (ha)	1983 Infested (ha)
Western Spruce Budworm	2,800	18,500
Two-Year Spruce Budworm	2	190
Douglas-fir Tussock Moth	500	170
Total	3,300	18,900

This year's survey was conducted by Forest Service staff over the eastern and northern part of the Region. In the Parks as well as in the Chilcotin, infestations were mapped by R. Andrews and A. Dawson of the Forest Insect and Disease Survey. Volumes for this part of the Chilcotin were obtained not from forest cover maps but through comparison of 1983 and 1982 areas attacked.

The 1983 aerial survey indicated a tremendous increase of infestation in the so-called "Narcosli" - more precisely the western portion of the Quesnel Timber Supply Area. The beetles moved at least 50 km northward between the 1982 and 1983 aerial surveys. Ground truthing in this area indicated the 1983 attack in some areas was 10 recent (green) attacked trees to one 1982 red attacked tree.

Further work is ongoing to determine and improve tne accuracy of the survey.

- M. Hamm, Cariboo Forest Region, Williams Lake

A History of Mountain Pine Beetle Infestations in the Cariboo Region. The present outbreak of mountain pine beetle in the Cariboo Forest Region began in the early 1970's, with moderate infestations at the north end of Cariboo Lake and in the Klinaklini River drainage. Smaller infestations were scattered in

the areas near Williams Lake and Riske Creek. In 1975, the Federal Insect and Disease Survey estimated 15,000 hectares of infestation in the Region.

By 1978, populations had become so large that winter mortalities of 90% had virtually no effect on expansion of the infestations to include some 31,000 hectares (again a conservative estimate).

In 1980 the Forest Service began conducting an intensive aerial survey for insect damage, and the improved method, coupled with a large expansion in infestation size resulted in an estimate of 158,000 hectares. Last year's estimate was 287,000 hectares, with an associated volume loss of over 3,000,000 cubic metres of mature pine.

Initial indications in 1983 are that the area infested will increase by 50% or more. Movement of beetles from the Chilcotin infestation into the previously "clean" Narcosli Provincial Forest by way of the Nasko, Clisbako, and Baezaeko River drainages is occurring with surprising rapidity. This Provincial Forest presently represents about 25 years of wood supply for the Quesnel Timber Supply Area (T.S.A.). This inventory will be significantly reduced as the infestation moves in and expands.

- M. Hamm, Cariboo Forest Region, Williams Lake

A Major Sale of Beetle-Killed Timber. Although in the period between May and December 1983 very little progress was made in pest management in Cariboo Region because of funding cuts and staff layoffs, a major sale of mountain pine beetle-killed timber in the West Chilcotin was initiated.

The Chief Forester authorized a Forest Licence with an allowable annual harvest of 500,000 m^3 of lodgepole pine timber for a period of ten years. The timber is within the Anahim, Tatla and Chilcotin Supply Blocks of the Williams Lake Timber Supply Area. Bark beetle-caused timber losses in these areas are shown in the table below.

BARK BEETLE-CAUSED TIMBER LOSSES IN THE ANAHIM, TATLA AND CHILCOTIN SUPPLY BLOCKS

(1982 Aerial Survey)

	Anahim		Tatla		Chilcotin		Total	
	Area (ha)	Volume (m^3)	Area (ha)	Volume (m^3)	Area (ha)	Volume (m^3)	Area (ha)	Volume (m^3)
Pl	40,800	314,000	102,000	847,000	18,200	157,000	161,000	1,320,000
F			17	108	386	9,760	403	9,870
S	7	10			33	400	40	410
All	40,800	314,000	102,000	847,000	18,600	167,000	161,000	1,330,000

Harvesting must commence within one year of the granting of the Licence. The Licence will be non-renewable and the successful applicants shall not be entitled to replacement privileges under the Forest Act.

Applications will be evaluated on their potential for creating and maintaining employment opportunities and other social benefits in the Province, providing for the management and utilization of Crown timber, furthering the development objectives of the Crown, meeting the objectives of the Crown in respect of environmental quality and the management of water, fisheries and wildlife resources, and contributing to Crown revenues.

Four applications received were opened November 1, 1983. The interest renews our optimism that other sales to harvest beetle-killed timber might also be undertaken by industry.

- D. Doidge, Cariboo Forest Region, Williams Lake

Proposed Thinning Trials to "Beetle-proof" Pine Stands. Thinning of mature lodgepole pine stands was reported to reduce subsequent losses to mountain pine beetle in the U.S.A. Although both thinning from above and thinning from below have been examined, most work has been done with thinning from above (i.e. cutting out the larger trees). A variety of diameter-limit cuttings have been tried including 18, 25 and 30 cm dbh limits. Resultant beetle-caused mortality was related to the level of cutting. The most severe thinning had the lowest level of beetle activity.

Thinning, however, may not be suitable as a general management tool. The residual stand could be uneconomic for further logging. The thinning technique appears most suitable where timber production is not a major concern as in watersheds, parks, leave strips and along stream sides where the maintenance of forest cover is important.

A demonstration trial of various thinning and cutting regimes is proposed for pine stands in B.C. Anyone who knows of potentially suitable areas should contact the undersigned. Demonstration blocks will be established as soon as possible and monitored for several years.

- P. Hall, Protection Branch, Victoria

Mountain Pine Beetle Film. Preliminary work will be undertaken this fiscal year to develop a mountain pine beetle film illustrating a range of available management techniques. The film will emphasize application of treatments such as pesticides, pheromones, single tree treatment, and harvesting. The film will supplement material in existing Ministry films such as "One Step Ahead" and "Chewers of Wood" and will be useful for training staff.

- P. Hall, Protection Branch, Victoria

Spruce Beetle Pheromone Supply. Protection Branch will maintain a stock of frontalin, the primary component of the spruce beetle aggregating pheromone.

Although supplies are limited, they are available to Ministry personnel wishing to use pheromones for spruce beetle management.

- P. Hall, Protection Branch, Victoria

Spruce Beetle Trap Tree Evaluation. Protection Branch obtained data from an experiment conducted in 1979 by A. Waters, Prince Rupert Forest Region, to test various treatments for spruce beetle trap trees. These data will be analyzed and reported in cooperation with Research Branch and Prince Rupert Region staff.

- P. Hall, Protection Branch, Victoria

Technical Audit of Beetle Control Programs. A technical audit of the Prince George Forest Region bark beetle program was held October 24, 1983. The review included: regional organization of the program, monitoring of projects, regionally supervised projects and general items. The audit was intended to aid future program development and to increase communication between Region and Branch.

A similar technical audit of the bark beetle program of Cariboo Region is planned for this fiscal year. Reports will be prepared and submitted to the Ministry Executive.

- P. Hall, Protection Branch, Victoria

Regional Bark Beetle Guidelines. The Prince Rupert Region bark beetle guidelines for detection, assessment and control were updated in June. New sections on control, Section 88 and on conducting a pesticide project were included. These guidelines are being used by district office and industry staff throughout the region.

- V. Barge, Prince Rupert Forest Region, Smithers

Monitoring Mountain Pine Beetle Flight Period. The Prince Rupert Forest Region used Lindgren funnel traps baited with mountain pine beetle pheromone to monitor pine beetle flight periods. This monitoring shortened the period specified by guidelines which prohibits hauling of infested logs. The traps were set up in various active logging areas within the Bulkley, Morice and Lakes Forest Districts.

The traps appeared workable and useful. Next year daily beetle counts will be plotted to determine to the day of shutdown prior to the major beetle flight day. Hopefully after a few years use and comparisons of daily beetle counts and temperature readings, this monitoring will maximize the safe hauling periods and allow the maximum time for harvesting which is essential for a beetle control program.

- V. Barge, Prince Rupert Forest Region, Smithers

Lethal Trap Trees Used Against Spruce Beetle in 1982. An Internal Report Spruce Beetle Suppression with Lethal Trap Trees in Central British Columbia in 1982 is in final draft form and will be available soon. A total of 510 lethal trap trees were deployed adjacent to Herrick Creek and its tributaries. In this second year of operational trials, we tested 3 dosages of monosodium methanearsenate. A dosage of 80 g of active ingredient per litre reduced larval success by 99% and showed no significant repellency of attacking adults.

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

Spruce Beetle Trap Tree Summary. On request of Protection Branch, a summary is being compiled and will be released as a provincial "Pest Management Report": Use of Conventional and Lethal Trap Trees Against Spruce Beetle in British Columbia 1978-1983. Review and Recommendations. Regional Pest Management Coordinators were requested to contribute relevant information.

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

Trials of Mountain Pine Beetle Control using Semiochemicals and Pesticides. Cariboo Region and Quesnel Forest District staff cooperated with Dr. John Borden, Simon Fraser University, to test various methods to control the beetle using pesticides and semiochemicals. One of the test areas chosen was the Clisbako River. Although the only access to the area was by helicopter, this was a good site to determine costs of controlling small inaccessible beetle infestations. However, the experiment was inconclusive because of the tremendous coincidental expansion of the beetle in the test area.

- D. Doidge, Cariboo Forest Region, Williams Lake

Mountain Pine Beetle Log-Hauling Ban. The Cariboo Forest Region instituted a ban on hauling infested lodgepole pine logs during the flight period of the mountain pine beetle. This hauling ban is intended to protect the areas of the Region that are free of the beetle as well as the areas surrounding the mills which would become infested if infested pine was decked in the mill yards.

- D. Doidge, Cariboo Forest Region, Williams Lake

Trials of Pheromones for Control of Mountain Pine Beetle and Spruce Beetle. Operational trials with mountain pine beetle and spruce beetle pheromone baits have shown good results. Baits were used primarily to suppress dispersal of beetles from logging blocks and areas in which single trees were treated. Most of the spruce beetle trials were undertaken by T. Maher, Entomologist, Northwood Pulp and Timber Ltd. Frontalure (one part frontalin to two parts alpha-pinene) was used and judged to be effective.

Mountain pine beetle baits were formulated using mycrene, exo-brevicomin, and trans-verbenol. These trials also appeared effective.

The Prince Rupert Forest Region expects to use more bark beetle pheromone in the coming season.

- T. Maher, Northwood Pulp and Timber Ltd., Prince George, and A. Stock, Prince Rupert Forest Region, Smithers

Mountain Pine Beetle in Manning Park: An Update. A mountain pine beetle control program in Manning Park successfully reduced an infestation of more than 5,000 beetle-attacked trees in 1981, to 252 trees in 1982, to 29 trees in 1982 and, hopefully, to 0 trees in 1984. Several agencies cooperated in the program including Ministry of Lands, Parks and Housing, Ministry of Forests, Canadian Forestry Service, Emergency Bridging Assistance Program, B.C. Institute of Technology, Simon Fraser University and University of B.C.

All detected green-attacked trees were felled, bucked, and burned prior to beetle flight periods. In 1983, September ground surveys conducted by CFS technicians revealed 29 green-attacked trees, 10 of which were baited with pheromone. These trees will be treated before summer 1984. This action should complete the current control efforts in Manning Park. However, numerous small groups of infested trees found up to 16 km east of the Park indicated a further beetle population buildup which, if not controlled, could reinfest the Park.

Continued surveillance will be required to maintain the present condition. Hopefully, an aerial survey can be conducted annually as a joint Ministry of Forests-Ministry of Lands, Parks and Housing project.

- D. Heppner, Vancouver Forest Region, Burnaby

Two-Phase Milling as a Solution to a Beetle Infestation Problem. The only access to a mountain pine beetle infestation on a high elevation productive site in the Squamish District is a B.C. Hydro road. A telecommunication cable buried in the road, however, prevents regular log transport.

Sanitation harvesting of this infestation will be undertaken by a two-phase milling process. A portable, dimension sawmill will be located on site to produce cants. A three-ton truck will be used to carry the cants to a secondary mill for further lumber manufacture.

- L. Mitchell, Squamish Forest District, Squamish and P. Wood, Vancouver Forest Region, Burnaby

Mountain Pine Beetle in Birkenhead Park. Parks Branch and Forest Service employees cooperatively undertook a single-tree sanitation project for beetle-infested pine trees at the south end of Birkenhead Lake Park. A total of 150 infested trees in and adjacent to the Park were felled and burned.

Older infested trees outside the Park will be available for building logs or firewood. Currently (1983) attacked trees will be designated for single tree burning.

- L. Mitchell, Squamish Forest District, Squamish

Nelson Region Beetle Management Activities. The major part of pest management activities in the Nelson Region continues to be directed at detection and salvage or control of bark beetle infestations. A total of 23,000 ha of current bark beetle infestations was recorded from aerial surveys conducted over susceptible lodgepole pine and Engelmann spruce stands in 1983.

Mountain pine beetle infestations in lodgepole pine stands totalled 21,000 ha compared to 37,000 ha in 1982. Spruce bark beetle infestations in Engelmann spruce stands were 2,800 ha compared with 7,400 ha in 1982.

Salvage/control harvesting and trap trees have been the major methods used to deal with these infestations. A limited amount of cut and burn and pheromones were used to contain spot infestations.

- E. Morris, Nelson Forest Region, Nelson

Mountain Pine Beetle Pheromone Operational Trials in the Nelson Region. As shown in the table, a total of 356 pheromone baits were employed in six of seven Districts in the Nelson Forest Region. Major objectives of the trials were:

1) Containment to prevent the emigration of 1983 emerging beetles from an infested area and thereby obviate a larger cutblock in 1984 to sanitize the area.
2) Cut and burn cleanup to attract beetles emerging from trees not located during cut and burn projects of winter 1982-83 into baited and nearby trees, thereby reducing search time needed to find newly attacked trees.

District	Objective of Treat.	No. of Locations	Area Treat.(Ha)	No. of Trees Treat.
Cranbrook	Containment	3	14.5	58
Invermere	Containment	4	34.0	136
Golden	Containment	1	8.3	33
	C & B Cleanup	1	4.3	17
Arrow	C & B Cleanup	2	2.0	8
Boundary	C & B Cleanup	2	3.0	12
Kootenay Lake	Containment	2	14.5	58
	C & B Cleanup	1	4.6	34
Total		16	85.2	356

A detailed assessment of the trials is underway and initial indications point to some success.

- D. Gray, Nelson Forest Region, Nelson

Mountain Pine Beetle Trap Tree Research. Nelson Region staff continued cooperative studies with Dr. John Borden, Simon Fraser University, on pheromones. Nine sites were chosen to test Sevin®, Dursban®, and monosodium methanearsenate combined with an aggregation pheromone to create lethal trap trees.

- D. Gray, Nelson Forest Region, Nelson

Douglas-fir Beetle Infestation Following the Aug Fire at Strathcona Provincial Park. A ground survey for Douglas-fir beetle in the area of the Aug Fire in Strathcona Provincial Park was conducted in October 1983. Preliminary assessments indicated some potential for moderate Douglas-fir beetle damage. Beetle attack of trees downed during or after the fire which provided suitable host material prior to beetle flight 1983 was moderate to high in the lower half of the burned area and virtually non-existent in the upper half of the area. Very little attack was found in standing trees. Trees which were attacked were always severely stressed from the fire.

A large population of beetles is expected to emerge in April and May 1984. Because most of the downed trees are no longer suitable for the beetle and large numbers of stressed trees are available, some attack of standing trees will be likely. However, the attack should not be substantial because most of the stressed trees should recover and resist attack.

- D. Heppner, Vancouver Forest Region, Burnaby

Control of Engraver Beetles in Ponderosa Pine Slash. Approximately 750 hectares of juvenile ponderosa pine, Douglas-fir and lodgepole pine were thinned in the Cranbrook Forest District during 1983 under the Employment Bridging Assistance Program. After high populations of Ips beetles were detected in much of the pine slash, a large-scale prescribed burning program was undertaken by District staff to reduce both the potential for future Ips outbreaks in these managed stands as well as to reduce the fire hazard associated with the slash accumulations.

- S. Byford, Cranbrook Forest District, Cranbrook

Infestations of Insect Defoliators in the Nelson Region. From aerial surveys, a total of 53,000 hectares of defoliation by insects was recorded including 32,000 hectares infested by hemlock looper, 10,500 ha by larch sawfly, 6,600 ha by larch budworm, 1,500 ha by Douglas-fir tussock moth and 2,300 ha by spruce budworm.

An infestation of Douglas-fir tussock moth after causing heavy defoliation to Douglas-fir at Rock Creek, Boundary District, collapsed in 1983. Examination of larvae in mid-summer showed a high incidence of virus. Subsequent surveys showed a low overwintering egg population.

To protect Douglas-fir trees defoliated in 1982 by tussock moth from bark beetle, Sevin was sprayed at the Christina Lake Golf Course in April 1983. A solution of 2% active ingredient using water as the diluent was sprayed on the main bole to a height of 5-7 meters on 90 mature Douglas-fir trees.

Examination of the treated trees in October showed no evidence of bark beetle attack. However, eight untreated trees which had recovered from moderate defoliation in 1981 were attacked. Apparently, defoliated trees should be protected from subsequent bark beetle attack for at least two years.

- E. Morris and D. Gray, Nelson Forest Region, Nelson

Douglas-fir Tussock Moth Control Program. A Provincial grant-in-aid program was established to aid private landowners in the Kamloops Forest Region to control tussock moth. Under this program, which paid 50% of the costs of treatment, 2675 ha were aerially treated: 2375 ha with acephate and 300 ha with carbaryl. Also numerous trees were treated by ground spray. A total of 325 applications were received and payments totalled approximately $55,000.

This program was administered by involved Regional Districts and coordinated by Kamloops Forest Region pest management staff.

- P. Hall, Protection Branch, Victoria

Monitoring Douglas-fir Mortality from Tussock Moth Defoliation. Permanent plots were established in infested areas of the Kamloops Forest Region in mature and immature stands defoliated from one to three years. Plots will be monitored annually to determine levels of mortality in relation to stand age, duration and severity of defoliation.

- S. Taylor and P. Hall, Protection Branch, Victoria

Assessment of Tussock Moth Egg Mass Surveys. Surveys of Douglas-fir tussock moth egg masses are used to predict tussock moth defoliation during epidemics. The ability to effectively plan tussock moth control operations is based on these estimates and therefore an assessment of the reliability of the survey technique was undertaken.

Predicted attack areas for 1983 will be compared with the actual attack for that year and the accuracy of the predicted amount and location of defoliation will be checked.

If the present survey system is found to be inadequate, then alternatives will be examined.

- S. Taylor, Protection Branch, Victoria

Weevil Brood Production and Overwintering Study. A study was initiated in the early summer of 1983 to determine (1) adult weevil (Pissodes strobi) production per attacked spruce leader and (2) the overwintering capabilities of brood in the leader. This information, currently lacking in the central interior of British Columbia, is necessary to formulate spruce weevil control strategies. First-year data should be available by mid-summer 1984.

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

Spruce Plantation Pests Studied. Surveys for pest incidence were completed in several spruce plantations established prior to 1973 in Supply Block "G" of the Prince George T.S.A. This study will form the basis of an M.F. thesis by R. Cozens studying under the supervision of Dr. J.A. McLean, Faculty of Forestry, University of B.C. This information will be used to determine significant pests in spruce plantations and the problems involved in growing a merchantable timber crop. Once these factors are known, stand management plans can be formulated and implemented.

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

Spruce Weevil Active in Prince George Plantations. Recent surveys in spruce plantations that have been established for ten years or more have shown significant, increasing populations of spruce weevil (Pissodes strobi). Initial attacks occurred generally when seedlings were approximately 1.5 metre height - at an age of seven or eight years - once the spruce leaders reached acceptable dimensions for the weevil and were free of brush influence. Control strategies to limit the spread of this serious forest insect pest must be developed and implemented immediately.

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

A Trial of Clipping Lodgepole Pine to Control Terminal Weevils. The project reported in PMP Volume 1, No. 2 was continued. Trees in the area were clipped again in July, 1983.

The results to date are inconclusive, but the study is intended to continue for another three years.

Area	% Attack	
	1982	1983
Untreated (control)	4.7	2.0
Treated (clipped)	2.8	2.1
Cost $/ha	4.51	7.44

Higher cost per hectare in 1983 was attributed to an increase in the coverage of the cutblock as the natural trees are taller and therefore were more often

attacked by the weevil (Pissodes terminalis). Costs per hectare next year should be comparable to those in 1983.

- D. Doidge, Cariboo Forest Region, Williams Lake

Spruce Weevil Surveys and Control in the Kitimat Valley. Valuable spruce plantations in the Kitimat Valley were surveyed during the winter of 1982 for spruce weevil (Pissodes strobi). An area of 2542 ha was surveyed using a system developed by the Vancouver Forest Region. Most weevil attack occurred in the south end of the valley. On 437 ha, 8885 leaders were clipped from August 4 to 18, 1983.

If funds are available, we will continue surveys and control next year.

- M. Larock and A. Stock, Prince Rupert Forest Region, Smithers

Vancouver Region Spruce Weevil Survey. A two year survey project to determine the intensity of weevil (Pissodes strobi) attack was completed for all spruce plantations in the Vancouver Region except for the Mid Coast District, which was recently added to the Region.

Although survey data have yet to be analyzed completely, a pattern seems apparent. Plantations north of Port Alice on Vancouver Island and Seymour Inlet on the mainland have little attack, indicating low weevil hazard. Except for a few isolated inlets, plantations south of the above locations are generally heavily attacked, indicating high weevil hazard.

Planting of Sitka spruce in 1984 will be continued only in those locations where there appears to be low weevil hazard.

- P. Wood, Vancouver Forest Region, Burnaby

Weevil Guidelines. Interim guidelines for management of weevil (Pissodes strobi) in coastal Sitka spruce stands were developed in the Vancouver Region. Leader clipping, fill-in planting with non-host species and site rehabilitation are recommended. Selection of an appropriate treatment is based on infestation levels of the weevil, stocking density and average height of the spruce trees. These guidelines will be presented in B.C. Forest Service Internal Report PM-V-4.

- P. Wood, Vancouver Forest Region, Burnaby

Leader Clipping as a Method to Control Pissodes Strobi. A five year clipping trial of weevil-infested spruce leaders was completed on 1 570 hectares in the Nootka Timber Supply Area by Forest Service personnel and Tahsis Company Limited (Ref. PMP 2(1): 13).

Results in 1983 showed a significant decrease in the infestation levels from 1982 and continued at less than one percent per year.

A detailed analysis of efficacy and cost effectiveness of the clipping program is underway and will be reported soon.

- D. Harris, Campbell River Forest District, Campbell River and P. Wood, Vancouver Forest Region, Burnaby

Proposed Black Army Cutworm Survey Techniques. Staff of Prince George Forest Region, Protection Branch and the Canadian Forestry Service discussed the development of a survey for black army cutworm. If an effective pheromone were isolated, a combination of fall pheromone trapping and pre-planting assessment of defoliation of herbaceous vegetation would provide the best indication of potential damage. A winter sampling scheme is probably impractical due to the difficulty of finding small larvae overwintering in the soil duff layer. Work to develop a predictive survey will continue.

- P. Hall, Protection Branch, Victoria

Black Army Cutworm Incidence Increases This Year. Black army cutworm (Actebia fennica Tauscher) was evident in 35 plantations in the southern portion of the Prince George Forest Region. Feeding was primarily on spruce and pine seedlings planted in 1983 but those planted in 1982 and 1981 were also fed upon. Damage levels ranged from light defoliation to mortality. A monitoring system is required to protect our investment of 40¢ per planted seedling from destruction by this pest.

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

Parasitism of Black Army Cutworm. Collections of black army cutworm pupae from the Prince George West Forest District in 1983 were reared by Regional Pest Management. Unemerged pupae were sent to the Forest Insect and Disease Survey Unit (Canadian Forestry Service) in Victoria for parasite identification. A total of 39% of all reared pupae was parasitized by Ichneumonids and Tachinids. Further information is available on request.

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

FOREST PATHOLOGY

Pine Mistletoe Evaluation. A contract has been made with J. Laut to determine if the lodgepole pine dwarf mistletoe computer technique is suitable for B.C. conditions. The technique is designed to evaluate infected stands by projecting volume growth in response to various management treatments. Analyses of plot data collected in 1982 should be completed in 1984.

- J. Muir, Protection Branch, Victoria

Dwarf Mistletoe Control Projects. Just under 4,000 hectares have been treated following harvest or during spacing to control dwarf mistletoe. Most of it (90%) was done under Federal-Provincial job creation projects E.B.A.P. (Employment Bridging Assistance Program) and N.E.E.D. (New Employment Expansion and Development Program).

- E. Wilford, Cariboo Forest Region, Williams Lake

Dwarf Mistletoe Control. In the Nelson Forest Region, sanitation cutting in mistletoe infected lodgepole pine stands was carried out in a number of areas during harvesting and site preparation. Several hundred hectares were treated.

- E. Morris, Nelson Forest Region, Nelson

An Evaluation of Aerial Surveys for Root Diseases. Fixed and rotary winged aircraft, flying at 120 - 160 kph at 150 - 300 m elevation above ground, were used to survey root rot centers near Duncan, Golden and Merritt this year. Previously ground-checked areas were examined aerially. Approximately four Armillaria mellea and 28 Phellinus weirii infection centers were surveyed.

Tree mortality was observed from the air but the symptoms were not distinctive enough to be directly attributed to Armillaria or Phellinus root diseases. Mortality appeared scattered and was mixed with insect-caused mortality in a number of areas. In immature stands even scattered mortality was difficult to observe, while in mature stands, disease openings could not be distinguished from natural openings. Thinning and yellowing crowns of infected trees were almost impossible to observe. Aerial surveys might still be possible, but only to map the extent of known diseased areas in pure stands where root rot is known to be the only contributor to stand mortality.

No further aerial root rot surveys are planned and a more detailed report of this work will be published.

- S. Taylor and J. Muir, Protection Branch, Victoria

Spruce Root Disease Study. Field work for an MSc thesis on spruce root diseases has been completed in the Prince George area by Hadrian Merler, a graduate student under the supervision of Dr. B.J. VanderKamp, Faculty of Forestry, University of B.C. The study, when completed, will provide information on the incidence of tomentosus root rot in young spruce stands, rates of spread and resistance of tree species to the disease. Early results show significant impact upon spruce growth through 60 years and indicate that alpine fir (Abies lasiocarpa) may be resistant to P. tomentosus.

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

Vancouver Region Root Disease Survey. Field work for this cooperative Ministry of Forests-Canadian Forestry Service survey (ref. PMP 1:1, p. 12; 1:2, p. 25) was completed. From eight to two hundred 20 ha samples, totalling 5700 ha, were randomly selected from Douglas-fir, Douglas-fir - Hemlock, and Douglas-fir - Cedar type groups within the Nootka and Quadra Timber Supply Areas.

Results for Phellinus weirii root disease in the Douglas-fir type group, although highly variable, showed marked differences between tree age classes and site quality classes. Two graphs of results are shown in Tables and Graphics Section for ecological subzones CWHa2 and CDFb1 (p. 50). Generally, good sites were more heavily infected than poor sites, and infection increased with tree age. Further analyses are planned to produce hazard ratings and set control priorities for the types examined.

A further examination of older age class results is planned to determine why there was an apparent downward trend in infection on medium, fir sites.

Other root diseases caused by Armillaria mellea, Fomes annosus and Verticicladiella wageneri occurred on average on less that 2.0% of the area sampled. V. wageneri was very scattered, usually killing only single trees of Douglas-fir. Armillaria, in several instances, killed pockets of Douglas-fir age 30 to 60 to a significant degree. F. annosus killed trees in less than 1.5% of the area of the Douglas-fir type.

Data analyses will be completed in winter 1983-84 in cooperation with Research Branch.

- J. Beale, Vancouver Forest Region, Burnaby

Stump Removal for Control of Phellinus weirii in a Thinning Project. A 5 ha trial stump pulling operation was undertaken as part of a thinning project in a stand of 40-year old Douglas-fir, 20-30 cm dbh. Two approaches were tried to reduce overall costs of stump removal.

A Bantam backhoe excavator was used instead of a bulldozer. This machine has a better mechanical advantage for pulling stumps. Stump pulling was also done in pockets of infected trees rather than over the whole area to minimize the area that required treatment.

Root rot centers were identified, all infected trees were felled and infected stumps were labelled for easy identification. The excavator removed 100 stumps at a total cost of $1,037.00. Pocket treatment of root rot centers minimized machine travel distance and the wide tracks resulted in minimal site disturbance. The treated infection centers will be planted with grand fir or rust-resistant white pine to supplement the final harvest expected in 40 to 45 years.

- L. Mitchell, Squamish Forest District, Squamish and P. Wood, Vancouver Forest Region, Burnaby

Operational Stump Removal Trials to Control Armillaria Root Disease. Two trials to determine the operational feasibility of stump removal for Douglas-fir root rot control were undertaken on severely infected sites in the Golden Forest District.

Objectives of a six hectare trial at Donald Station were:

1. Determine the economic feasibility of stump removal as a condition of a salvage harvesting contract at no cost to the Ministry; and
2. Assess and compare site impact, cost and productivity of stump removal with a tracked excavator and a crawler tractor.

Objectives of a 26 hectare trial at Marl Creek were to determine and compare productivity, cost, and site impact of stump removal with D7G and D8K crawler tractors equipped with brush blades.

Results at Donald Station indicated that soil displacement, compaction and root breakage were least with a tracked excavator. This was attributed to the snow surface and the pulling action of the excavator as opposed to the pushing-rolling action of the crawler tractor.

Stump removal productivity was best and approximately 50% cheaper with the crawler tractor. Acceptable site impacts were evident on drier, deeper soils up to approximately 30% slope. Unacceptable impact levels resulted on shallower soils on slopes in excess of 35% and on wet areas.

At Marl Creek, stump removal costs averaged $509 per hectare for the D7G and $562 per hectare for the D8K. Both machine operators felt that productivity could have been increased by 20% if stumps were removed in drier months when soil moisture content was lowest.

Stump removal as a condition of the harvesting contract was economically feasible in the Donald Station trial. The licensee and several other contractors stated they would be interested in bidding on future timber sales where stump removal was a contract condition.

Recommendations from these trials were:

1. Where serious root rot infestations occur in high-value Douglas-fir stands, the high timber value of these stands should cover the site treatment cost of stump removal. Where stump removal is the only viable treatment to control root disease, include stump removal as a contract condition of direct salvage sales or include stump removal as an appraisal cost of stumpage in tendered small business or quota-holder sales.

2. To reduce soil compaction and puddling, conduct machine operations on snow or when soil moisture is low. Late summer is preferable. On moist, shallow soils, use excavators for stump removal. Avoid wet sites.

3. Avoid excessive soil displacement when using crawler tractors. Do not scalp the soil; roll, rather than push stumps.

4. Clean-skid or burn sites prior to stump removal if heavy slash loading is present. This will improve stump removal efficiency and quality.

5. Use larger, high-horsepower machines, e.g. D7 or equivalent because track spin is reduced and a higher blade lift improves lifting-rolling action. It is imperative to use experienced machine operators.

6. To reduce soil erosion and other undesirable effects, use soil surveys, maps, and field checks to determine maximum workable slope and avoid highly sensitive soils.

- L. Price, Golden Forest District, Golden

Rhizina Root Disease in Cariboo Burned Areas. Rhizina root disease was found on several cutblocks which were burned in the fall of 1982 in the eastern, wet belt portion of the Cariboo. The cutblocks were planted in the spring of 1983 and up to 35% of the seedlings were killed.

Some operational trials will be established on blocks burned in 1983 and planted in 1984 to find a method of reducing the impact of the disease. Delaying of planting by several years to allow development of disease-antagonistic organisms should prevent seedling losses. However, a planting delay results in severe unacceptable weed competition on some sites.

- T. Wilford, Cariboo Forest Region, Williams Lake

Breeding Western White Pine. In June of this year, the Ministry of Forests and the Canadian Forestry Service (Pacific Forest Research Centre) signed a Memorandum of Understanding on Breeding Western White Pines for increased disease resistance to blister rust. The memorandum established the Canadian Forestry Service as a member of the Coast and Interior Tree Improvement Councils with the same responsibilities and cooperative opportunities presently in place for Ministry-directed tree improvement programs under the aegis of the Tree Improvement Councils.

The Canadian Forestry Service will provide expertise in pathology and genetics to elucidate the genetics of both host tree and rust relative to resistance mechanisms, to develop appropriate breeding strategies and to undertake selection and screening of trees with increased resistance.

CFS presently is recruiting a geneticist. Detailed planning should begin some time early in the New Year. For details contact D.R. Macdonald, Director, Pacific Forest Research Centre, Victoria, B.C., (388-3811), or the undersigned.

- J. Dangerfield, Research Branch, Victoria

White Pine Blister Rust Control. Young white pine trees were pruned in conjunction with juvenile spacing on over 200 hectares on Tree Farm Licence 23, B.C. Timber Ltd. The objective was to reduce white pine mortality from blister rust in managed stands and maximize the number of white pine at rotation age.

At Halfway River, Upper Arrow Lakes, four stand treatments were done to compare their effectiveness:

1) Pruning and spacing;
2) Pruning and no spacing;
3) No pruning with spacing; and
4) No pruning or spacing.

Results of these treatments will be monitored.

Sixty-five white pine seed trees apparently resistant to blister rust were selected on TFL 23. Seed was collected from these trees and sent to Idaho for growing and resistance testing.

- M. Mack, B.C. Timber, Nakusp, and E. Morris, Nelson Forest Region, Nelson

Pruning Trials for White Pine Blister Rust. Following inspection of several projects and discussions with field staff, guidelines for monitoring effects of pruning trials were drafted and circulated for review and comments.

- J. Muir, Protection Branch, Victoria

FOREST VEGETATION MANAGEMENT

Brush Control Trial, Blue River. In July 1981, Roundup (glyphosate) was sprayed at 0.85 kg a.i./ha and 0.48 kg a.i./ha on white flowering rhododendron and false azalea at 1675 m elevation.

A visual assessment two years following treatment showed 90% and 75-80% reduction in brush cover at the 0.85 kg and 0.48 kg (5% + 3% solutions) rates respectively. Apparently, glyphosate at 1 kg a.i./ha will provide pre-or post-planting control on sites overgrown with rhododendron and false azalea. Broadcast burning following logging evidently can accomplish similar results judging from burns carried out on adjacent areas.

- J. Gilmour, Silviculture Branch, Victoria

Alder Control Trials with 2,4-D Amine Foliar Spray. During September 1983, B.C. Forest Products (Crofton Division) and MOF Silviculture Branch carried out a cooperative trial of foliar-sprayed 2,4-D amine for control of alder. Plots were established in several biogeoclimatic subzones in the Vancouver Region. Application rates of 2, 3 and 4 kg a.i./ha were tested. An untreated

control and a manually treated block were established to compare treatment times and growth results of released conifers. Estimates of production will be compiled. Early examinations suggest that the spraying was successful.

- J. Gilmour, Silviculture Branch, Victoria

Estimates of Forest Brush Problems in British Columbia. The main purpose of this Silviculture Branch project is to estimate brush areas (hectares) on productive forest sites (good and medium) of the Province. Brush areas of all forest cover types (Backlog NSR, Current NSR, NC Brush, SR, pure deciduous, deciduous/coniferous and coniferous/deciduous areas), as well as estimated areas to be added annually to brush by denudation will be included.

From the hectare figures, the cost to B.C. and Canada in terms of volume (m^3), stumpage ($) and shipment ($) losses for lack of vegetation management actions, will be estimated.

The report will be available early in 1984.

- J. Boateng, Silviculture Branch, Victoria

Backlog Brush Control. In the Nootka Timber Supply Area, extensive brush curtails the growth and survival of coniferous plantations. For several drainages, large-scale brush control programs are being developed to utilize a variety of treatments selected on the basis of site-specific conditions.

Vegetation control practices used to date include: mechanical site rehabilitation, chemical brush control, hack and squirt, manual girdling of alder and use of Asulox for bracken control. In addition to these programs, roadside spray programs will be emphasized to prevent alder penetration into newly disturbed areas.

- J. McClarnon, Campbell River Forest District, Campbell River.

Effingham Herbicide Spray Project. In August 1983, 2,4-D ester and amine were applied aerially by Ministry of Forests staff to 185 hectares in the Port Alberni District. The objectives of this project were: 1) to use 2,4-D ester to release conifers from brush competition, and 2) to gather additional efficacy data to support the registration of 2,4-D amine.

Surveys of the treatment area indicated a good initial kill of brush. To monitor spray deposit, krome kote® cards were placed in the pesticide-free zone along a creek. Results indicated that spray did not occur within 75 meters of the creek. The permit requirement of a 10 meter buffer therefore was accomplished with a comfortable margin of safety. Detailed follow-up surveys are scheduled for June, 1984 and a report will follow this assessment.

The Effingham project was the only major aerial herbicide spray project conducted in 1983. It was a good opportunity to monitor aerial application procedures and to make recommendations for future projects. A summary report of these points will be forthcoming early in 1984.

- S. Taylor and J. Henigman, Protection Branch, Victoria

RANGE MANAGEMENT

Nelson Region Range Pest Management. An integrated program of rangeland weed control is operating in the Nelson Forest Region with coordinated efforts of Ministry of Forests, various Livestock Associations, Kootenay Boundary Regional District, B.C. Ministry of Highways, B.C. Ministry of Agriculture and Agriculture Canada. Activities include improving public awareness of weed problems, releasing biological control agents, monitoring and assessing weed infestations and control activities and containing weed infestations by herbicide treatments.

A major weed problem of greatest present or potential impact to the livestock industry and to wildlife habitat is knapweed, particularly in the western portion of the Region. Boundary District has extensive infestations. Efforts are directed at controlling seed spread by treating roadsides and other sources with the herbicide Tordon 22K and establishing then dispersing biological control agents. The Ministry of Forests maintains a spray crew at the Boundary District Office and assists Agriculture Canada in the release and dispersal of bio-control agents.

The extent of infestation in Boundary District necessitates the use of bio-control agents. Since their original release in 1970 and 1972, secondary releases of the root mining beetle, Sphenoptera jugoslavica, have been made and the seed-head, gall-forming flies Urophora affinis and U. quadrifasiata have dispersed throughout the Region. In the fall of 1982, a root mining moth, Agapete zoegana, was released near Grand Forks. In the near future, the root mining moth Pelochrista medullana will be released.

In the eastern portion of the Nelson Region, Cranbrook and Invermere Districts, an ongoing program, including herbicide treatments since 1967, has kept knapweed under control. Efforts include treating, either with herbicides or culturally, all known knapweed infestations and surveying the area to find new infestations. The Ministry of Forests employs a spray crew at the Cranbrook District Office and has a spray unit at the Invermere District Office.

Crucial to the success of these weed programs are campaigns that encourage prevention of weed problems through proper range management and early detection. The substantial effort to maintain control in the East Kootenays has protected more than 60,000 ha of open and semi-open rangelands from infestations.

- R. Drinkwater, Nelson Forest Region, Nelson

Control of Weeds on Cariboo Range Land. In 1983, the Range Section treated 154 sites totalling 71 ha infested by noxious weeds using 55 kg of picloram (Tordon 22K). The program emphasized control of knapweed, although there was some treatment of other noxious weeds.

Efforts in 1983 were successful largely due to the diligence of the weed crew. Almost all sites treated in the past three years were inspected and sprayed where necessary. New infestations were treated or mapped for treatment next year.

The following table summarizes the area treated in 1983 by weed species.

	Area (ha)
Diffuse knapweed	38.9
Spotted knapweed	24.7
Russian knapweed	0.3
Nodding thistle	5.4
Canada thistle	1.8
Burdock	0.03
Blueweed	0.0005
	71.1

Most treatment activity was in the Clinton area where knapweed has become firmly established. Yearly treatment will be required in this area to prevent further spread. Blueweed and Dalmation toadflax are also troublesome in Clinton and surrounding area.

Some spraying of nodding thistle was done at Alexis Creek. Approximately 50 ha are infested by this weed, mostly on the south side of the Chilcotin River near Deer Creek Ranch. Control efforts should be intensified in this area. However, the private landowner will have to cooperate to ensure that the treatment will be effective.

Other noxious weeds such as Canada thistle and burdock were essentially ignored.

A central problem with our noxious weed control efforts is the lack of concern and action on the part of some private landowners. Some work was done on private land this past summer adjacent to Crown range. Although some landowners appear concerned, many of them show little effort to control weeds on their property. Some are unconcerned.

The Weed Control Act makes private landowners responsible for noxious weed control on their land. Local Stock Associations have undertaken treatments, but some members have not treated their private lands.

Further efforts to promote noxious weed control in the Cariboo are planned.

- G. Leroux, Cariboo Forest Region, Williams Lake

PESTICIDES

Ministry Guidelines for Pesticide Storage and Transportation. Guidelines for storage and transport of pesticides are now available from Protection Branch, Victoria. Guidelines, developed in cooperation with Ministry of Environment, outline how a storage facility should be constructed in order to ensure safe storage of pesticides and facilitate loading, unloading and mixing of materials.

Minimum requirements for safely transporting pesticides are outlined. These include securing pesticide containers from spillage or theft and ensuring that individuals transporting the pesticides are both aware of the contents and able to handle an emergency.

For further information concerning pesticide storage and transportation, contact the author or Geoff Hoyt, Technical Services Branch, 387-1341.

- J. Henigman, Protection Branch, Victoria

Audio-Visual Slide Show for Forest Pesticide Training. A slide show summarizing forestry pesticide use information is now being edited under contract from Protection Branch. The show will consist of approximately four to six 15 minute presentations outlining, for example, pest management philosophy, pesticide regulations and permits, pesticide registrations, and specific forestry uses.

A major use of the slide show will be for pesticide certification courses to ensure that information provided to students is standardized and consistent. An information handout will be provided.

The slide show also could be used by regional personnel for short refresher courses without the need for Branch staff specialists to attend all training programs.

- J. Henigman and S. Taylor, Protection Branch, Victoria

Position Papers on Pesticides. Several position papers on pesticide use were issued recently. "The Use of Herbicides in Forestry" was prepared by the Canadian Federation of Professional Foresters' Associations. Another recent statement on forest pesticides is included in the B.C. Wildlife Federation's forest policy. A Ministry of Forests statement issued in 1981 is currently under review for update and reissue during 1984.

During the past three years, about a dozen papers have been prepared and distributed by regulatory agencies, users and concerned organizations.

- R. DeBoo, Protection Branch, Victoria

Forest Pesticide Certification Courses. Beginning in 1984, all forestry pesticide applicators courses will be conducted by the Ministry of Forests in cooperation with the Pesticide Control Branch, Ministry of Environment. This change was prompted by reduced training budgets within the Pesticide Control Branch and by the need to include more training on forestry application equipment.

The course takes approximately five days. A classroom session will review information previously covered in other certification courses and practical demonstrations will be held outdoors. At the conclusion of the course, students will be able to conduct a variety of operations including a hack and squirt program and calibrate and adjust aircraft spray equipment.

The certification examination, adjudicated by the Pesticide Control Branch, will entail core issues for all applicators and elective specialty questions covering forest herbicide use, forest insecticide use, range and nurseries.

Any interested participants should preregister for this course by calling either the author or Quentin Laws, Forest Service Training School, 585-1101.

- J. Henigman, Protection Branch, Victoria

Preparation of the "Forest Pesticide Handbook of B.C.". A new Forest Pesticide Handbook of B.C. should be available in summer, 1984. Recently the first parts of the handbook have been extensively edited under contract with D. Beardsley, in a style suitable for operational foresters.

The handbook will total 600 pages in six volumes of 50-150 pages each. Updating and revising the information will be an essential and regular function of Protection Branch.

The handbook will include the following information:

Vol. I
- How to Implement A Pesticide Project
- Public Information
- Safety and Emergency Information

Vol. II
- Forestry Pesticide Information
- Forestry Rights-of-Way Pesticide Information

Vol. III
- Nursery, Seed and Cone Pesticide Information
- Ornamental Pesticide Information

Vol. IV
- Pesticide Application Techniques
- Reference Tables and Formulae

Vol. V
- Pesticide Application Equipment
- Pesticide Storage and Transportation

Vol. VI
- Administrative and Background Information for Pesticide Use in B.C. Forestry

For further information concerning the handbook, contact the author at 387-5965.

- J. Henigman, Protection Branch, Victoria

PesTopic on Bacillus thuringiensis. A summary of the use of the bacterium Bacillus thuringiensis (Bt) will soon be available from Protection Branch. The PesTopic, written for the general public, will describe what Bt is, its mode of action and conditions under which it can be used to control forest pests. This PesTopic should clarify the use of this biological pest control agent.

- J. Henigman, Protection Branch, Victoria

A PesTopic on Forest Pesticide Regulation and Use. A summary of the Ministry of Environment, Pesticide Control Branch, pesticide use permit system will soon be available from Protection Branch. The PesTopic outlines for the general public what information is required to obtain a forest pesticide use permit.
The procedures to follow and the agencies involved will also be described. This summary should help demystify a complex regulatory process.

- J. Henigman, Protection Branch, Victoria

New Deer Repellent. A deer repellent composed of putrescent (rotten) whole egg solids is now registered with the name Deer-Away Big Game Repellent MGK (BGR) Concentrate 2103, PCP #17667. The repellent may be applied to conifer seedlings as needed to reduce browsing. As this is a new product, a variety of plantation tests with this repellent would be desirable to determine the best use of the repellent.

- J. Henigman, Protection Branch, Victoria

Judicial Ruling on Use of 2,4,5-T. A Nova Scotia Supreme Court trial on the use of 2,4,5-T has ruled in a 180-page judgement in favour of the forest company and use of herbicide. The judgement, available in Ministry Regional libraries, is extremely interesting and easily read. It indicates very strongly that there is little to fear from 2,4,5-T.

Dow Chemical, the major producer of 2,4,5-T, has decided to stop defending the herbicide to the U.S. Environmental Protection Agency (EPA) after spending in excess of 10 million dollars. Dow Chemical will instead promote a new herbicide, Garlon, which is not yet registered in Canada. In Canada, other companies still supply 2,4,5-T.

Regardless of Dow's decision, there are no technical problems restricting the use of 2,4,5-T in B.C. However, political resistance to the use of the herbicide in B.C. remains an obstacle.

- J. Henigman, Protection Branch, Victoria

New Forest Herbicides. Some new herbicides long awaited by silviculturists in B.C. should soon be available.

Monsanto indicates Roundup should be fully registered for forestry in 1984. In order to introduce the chemical to the B.C. forestry market, Monsanto plans two seminars on the product in the spring.

Dupont's Velpar Liquid apparently will be registered for ground use in spring 1984. More efficacy data are needed on this chemical, particularly for interior brush control.

- J. Henigman, Protection Branch, Victoria

Aerial Applications of Insecticides in B.C. Forests. A list of aerial sprays used from 1929-82 in B.C. to control forest insects was compiled by the Canadian Forestry Service, Victoria, and is shown in the Tables and Graphics Section (p. 52). For additional details concerning this information please contact either the undersigned or Dr. Roy Shepherd at 388-3811.

- J. Henigman, Protection Branch, Victoria

Cariboo Regional Guidelines on Use of Herbicides. Cariboo Region prepared a position paper on use of herbicides. It advocates the use of herbicides to control problem vegetation, especially on brush-prone sites, which cannot be controlled by available management techniques. Administrative responsibilities to implement more effective management techniques are outlined. Copies of the guidelines are available on request.

- D. Doidge, Cariboo Forest Region, Williams Lake

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

Protection Branch

R.F. (Bob) DeBoo, Manager, Pest Management, Victoria, 387-5965(*)
P.M. (Peter) Hall, Forest Entomologist, Victoria, 387-5965
J.F. (John) Henigman, Pesticide Specialist, Victoria, 387-5965(*)
J.A. (John) Muir, Forest Pathologist, Victoria, 387-5965(*)
D.W. (Doug) Ross, Pest Management Forester, Victoria, 387-5965
S.P. (Stuart) Taylor, Pest Management Technician, Victoria, 387-5965
P.J. (Pat) Humphreys, Pest Management Technician, Victoria, 387-5965

Silviculture Branch

D. (Don) Summers, Seed Production Pest Management Officer, Victoria, 387-1191(*)
J. (Jacob) Boateng, Brushing and Weeding Specialist, Victoria, 387-1191
G.M. (Gwen) Shrimpton, Nursery Pest Biologist, Surrey Nursery, 576-9161(*)

Inventory Branch (partial involvement)

D.M. (Doug) Fligg, Manager, Depletion and Update, Victoria, 387-1345
B.M. (Brian) Hall, Depletion Officer, Victoria, 387-1814
J. (John) Kiss, Decay and Waste Officer, Victoria, 387-6729
S. (Steve) Ilnytzky, Depletion Coordinator, Victoria, 387-1814
R. (Ray) Leduc, Depletion Coordinator, Victoria, 387-5436
R.E. (Rick) Woods, Depletion Coordinator, Victoria, 387-1814
K.S. (Ken) Richardson, Decay and Waste Coordinator, Victoria, 387-6729
L.E. (Lloyd) Wilson, Decay and Waste Coordinator, Victoria, 387-6729

Cariboo Forest Region

D.F. (Don) Doidge, Regional Pest Management Coordinator, Williams Lake, 398-7121
E.H. (Ted) Wilford, Forest Pathologist, Williams Lake, 398-7121
M. (Mark) Hamm, Pest Management Technician, Williams Lake, 398-7121
R.M. (Ralph) Kossinn, District Pest Management Coordinator, Quesnel, 992-2147
D.R. (Derek) Poole, District Pest Management Coordinator, Horsefly, 620-3327
K.J. (Kevin) Lukes, District Pest Management Coordinator, 100 Mile House, 395-3844
J.D. (Dave) Peterson, District Pest Management Coordinator, Alexis Creek, 394-4215

Kamloops Forest Region

R.D. (Ron) Edward, Pest Management Coordinator, Kamloops, 374-7741
E. (Eric) Haupt, Pest Management Officer, Protection, Vernon, 542-0264
R. (Bob) Beck, Pest Management Technician, Kamloops District, 372-5832

Nelson Forest Region

E. (Ernie) Morris, Pest Management Coordinator, Nelson, 354-4181
D. (David) Gray, Regional Forest Entomologist, Nelson, 354-4181(*)
D. (Steve) Byford, Pest Management Officer, Cranbrook, 426-3391
E. (Emile) Begin, Pest Management Officer, Invermere, 342-9257
L. (Larry) Price, Pest Management Officer, Golden, 344-5991
H. (Hugh) Kingwell, Pest Management Officer, Arrow, 365-8402
D. (Dan) Reiben, Pest Management Officer, Arrow, 365-8402
B. (Ben) Zuber, Pest Management Officer, Boundary, 422-2766
M. (Mike) Pascuzzo, Pest Management Officer, Kootenay Lake, 428-2030

Prince George Forest Region

R.D. (Russ) Cozens, Pest Management Coordinator, Prince George, 564-0778(*)

R.S. (Bob) Hodgkinson, Forest Entomologist, Prince George, 564-0778(*)
F.L. (Fred) Turner, Resource Officer Protection, Prince George West, 564-6634
G.E. (Gerry) Magee, Resource Officer Protection, Prince George East, 562-4121
R.G. (Roger) Wiltsie, Resource Officer Protection, McBride, 569-2265
S.V. (Sam) Campese, Resource Officer Protection, Vanderhoof, 567-9281
J.A. (John) Reid, Resource Officer Protection, Ft. St. James, 996-7131
J. (James) Jones, Acting Resource Officer Protection, Mackenzie, 997-3310
D.E. (Doug) Swaffield, Resource Officer Protection, Dawson Creek, 782-8195
W. (Walter) Johnston, Resource Officer Protection, Ft. St. John, 785-8177
R. (Roy) Simpson, Resource Officer Protection, Ft. Nelson, 774-3936

Prince Rupert Forest Region

V.G. (Vern) Barge, Pest Management Coordinator, Smithers, 847-4511
A.J. (Art) Stock, Forest Entomologist, Smithers, 847-4511
R.P. (Bob) Rowsell, Bark Beetle Field Specialist, Smithers, 847-4511
W.F. (Bill) Davidson, Protection Resource Officer, Burns Lake, 692-7515
A. (Al) Hunter, Protection Resource Officer, Houston, 845-7712
D. (Dave) Nelson, Protection Resource Officer, Smithers, 847-2631
N.J.L. (Nils) Andersson, Protection Resource Officer, Hazelton, 842-6581
J. (Joe) Katasanoff, Protection Resource Officer, Terrace, 638-8541
W.T.S. (Bill) Jackson, Protection Resource Officer, Prince Rupert, 624-6848
K. (Ken) Brahniuk, Protection Resource Officer, Queen Charlotte City, 559-4476
W.D. (Bill) Harvie, Protection Resource Officer, Dease Lake, 771-4141

Vancouver Forest Region

P. (Paul) Wood, Pest Management Coordinator, Burnaby, 299-9151
J.D. (Jeff) Beale, Forest Pathologist, Burnaby, 299-9151
D.G. (Don) Heppner, Pest Management Assistant, Vancouver, 299-9151
D. (Dave) Hames, Protection Resource Officer, Chilliwack, 794-3361
L. (Lance) Mitchell, Protection Resource Assistant, Squamish, 898-9671
R. (Ron) Diprose, Protection Resource Assistant, Powell River, 485-9831
G. (Greg) Hemphill, Pest Management Resource Assistant, Duncan, 746-5123
D. (Doug) Harris, Pest Management Resource Assistant, Campbell River, 287-2194
R. (Rob) Furness, Protection Resource Assistant, Sechelt, 885-5174
D.C. (Dennis) Tippie, Protection Resource Officer, Bella Coola, 799-5352
D. (Dan) Powell, Protection Resource Officer, Port Alberni, 724-5786
S. (Stan) Gripitch, Protection Resource Officer, Port McNeill, 956-4416

*Member, Professional Pest Management Association of B.C.

MEETINGS

Herbicide Discussions and Tour. Dr. Phillip Reynolds, Forest Pest Management Institute, herbicide project leader, spent two days in the Cariboo Region: one-half day in the office in general discussions and a day and one-half in the field. The tour included dry belt problems generally west of the Fraser River and wet belt problems east of the Fraser River.

The situations discussed on the dry belt tour were: knapweed, thistle, conifer encroachment, grass-tree interaction and brown and burn for lodgepole pine rehabilitation.

Dr. Reynolds was very interested in this section of the tour because herbicides are not usually considered for these uses, except of course for the noxious weeds.

The wet belt tour was more conventional and the subjects viewed and discussed were: hardwood invasion, herbaceous brush, plantation establishment, and survival and grass-tree interactions in plantations. The herbicides discussed were Roundup, Velpar and Garlon.

Also discussed was the make-up of the F.P.M.I. herbicide project as it related to the interaction between the Pacific Forest Research Centre and the B.C. Ministry of Forests.

- D. Doidge, Cariboo Forest Region, Williams Lake

Demonstration of Herbicide Application Techniques. To promote an understanding of ground-level application techniques for herbicides. Silviculture Branch, in cooperation with Kamloops Region and District Silviculture staff, conducted a two day demonstration during August, 1983 at Derick Lake.

Ten Ministry employees from various Districts within the Kamloops Region plus one industry employee attended.

Herbicides used, legal requirements, crew training and procedures for dealing with herbicide spills were discussed. A demonstration followed, showing various backpack sprayers, calibration methods, personal safety gear and ways to assess herbicide efficacy.

- J. Gilmour, Silviculture Branch, Victoria

Coast Silviculture Committee (July 13-14). Among several interesting items seen during the field trips were: a white pine pruning trial to protect against blister rust; a hemlock mistletoe sanitation thinning; a demonstration of abnormal growth and injuries of trees attributed to nutrient deficiencies or imbalances discussed by Reid Carter, Faculty of Forestry, Univ. B.C., in cooperation with K. Klinka, Vancouver Regional Office; and site rehabilitation using a brush saw with an apparatus to dispense herbicide onto the saw blade.

- J. Muir, Protection Branch, Victoria

Hemlock Mistletoe Workshop. A workshop to discuss impact and management of coastal western hemlock dwarf mistletoe was held August 15-16, 1983, at B.C. Institute of Technology. Thirty participants represented governments,

industry and universities. Researchers R. Smith, A. Thomson, R. Alfaro and W. Bloomberg from Canadian Forestry Service, Pacific Forest Research Centre, Victoria, presented recent data analyses of results from surveys and stem analyses undertaken in 1972-74, and outlined mistletoe control strategies for young infected stands using a computer model (DWARF).

These data and other information were discussed and guidelines were recommended for management of infected hemlock stands. A summary of the proceedings is being prepared.

- J. Muir, Protection Branch, Victoria

Borax Stump Treatment. A one-day workshop was held in Victoria on April 1983 to discuss needs, policy and management guidelines to treat second-growth stumps with borax. This treatment is intended to prevent the wood decay fungus Fomes annosus from penetrating into stumps and into adjacent living trees. D. Morrison, Pacific Forest Research Centre, outlined background information and discussed some of his preliminary research results.

Representatives from B.C. Ministry of Forests and two forest industrial companies discussed various aspects of the problem. Several recommendations were made by the group including that hemlock, true fir (balsam), and spruce stumps 10 cm diameter and larger should be treated with borax during juvenile spacing. Further work, including registration of zinc sulphate, a more effective protectant, is needed.

- J. Muir, Protection Branch, Victoria

Interagency Committee - Mountain Pine Beetle. A meeting of the technical subcommittee of the Interagency Committee for Mountain Pine Beetle was held in Fernie during the week of October 2. Agencies represented included B.C. Ministry of Forests, B.C. Parks, Alberta Forest Service, Canadian Forestry Service and Parks Canada. Progress of beetle operations in the B.C./Alberta border area was discussed.

- P. Hall, Protection Branch, Victoria

USA-Canada Mountain Pine Beetle Agreement. Several meetings concerning the U.S./Canada Mountain Pine Beetle Agreement were held. The Ministry of Forests agreed to establish control demonstration areas including thinning trials. U.S. Forest Service and Canadian Forestry Service also collected data for refinement of hazard rating systems for mountain pine beetle.

- P. Hall, Protection Branch, Victoria

Forest Pest Review Committee. The annual spring, field-trip meeting was held at Prince George, May 18 and 19, 1983. Following a business meeting at the

Holiday Inn, members visited the Red Rock Seed Orchard. After lunch, insects and diseases were viewed in the lodgepole pine and spruce provenance plantations on site. The second day was spent east of Prince George in the Purden Lake area viewing and discussing pests and pest management options for young stands of lodgepole pine and spruce.

The usual winter meeting will be held on December 8, 1983 at Pacific Forest Research Centre, Victoria, to review results of Canadian Forestry Service pest surveys and discuss pest management operations by the Ministry of Forests and others.

- D. Summers, Silviculture Branch, Victoria (Secretary, F.P.R.C.)

Expert Committee on Weeds. The annual meeting of ECW held in Vancouver 29 November-1 December 1983, featured three speakers on forest herbicides. John Manville of the Pacific Forest Research Centre outlined research goals and priorities. Bob Jones, Silviculture Branch, discussed the importance of vegetation control in forestry and Rod Carrow, Chairman of the Canadian Council of Resource and Environment Ministers Task Force on Forest Pesticides, outlined the important need for more registered herbicides to accomplish forestry objectives.

- J. Henigman, Protection Branch, Victoria

Ad Hoc Committee on Forest Pesticides. At several recent meetings of this group, guests representing a variety of organizations were invited to present their views on issues of mutual concern. Guests included Bob Nixon of Greenpeace, Adrian Miller of the Integrated Vegetation Management Association and John Sehmer of the B.C. Medical Association. The next meeting, tentatively scheduled for December, will include discussion with Marilyn Kansky of the West Coast Environmental Law Association. Objectives of these sessions are to encourage positive dialogue and to promote rational perspective of pesticide use and regulation.

- J. Henigman and R. DeBoo, Protection Branch, Victoria

Professional Pest Management Association of B.C. The next annual meeting of this association is tentatively scheduled for February, 1984. The theme will be the future of forest pest management in B.C. This organization is working on several policy statements, including one on the use of pesticides in B.C.

- R. DeBoo, Protection Branch, Victoria

Western International Forest Disease Work Conference. The annual meeting of WIFDWC was held August 23-25, 1983, at Coeur d'Alene, Idaho. Highlights of the workshop included presentations and discussions on root diseases, dwarf mistletoes, white pine blister rust, and automatic field data tabulators.

Another session was training for disease recognition and prescribing management treatments. Field trips were held to view problems at local nurseries and forests. A list of common names of forest tree diseases was circulated for comment prior to the anticipated publication of the list by the U.S. Forest Service in 1984. R. DeBoo presented a summary of B.C. Ministry of Forests activities and plans.

- J. Muir, Protection Branch, Victoria

Pest Management Planning Workshop. Regional and District staff held a workshop, August 23, 1983 at Smithers to discuss pest management detection and the future role of industry in detection and control. The workshop led to the formation of a Regional pest management plan combining the present district pest management plans, regional coordination, strategies, standards and a model for statistics. This plan should be completed in December 1983.

- V. Barge, Prince Rupert Forest Region, Smithers

Prince Rupert Region Pest Review Committee. The Prince Rupert Forest Region Pest Review Committee meeting was held on October 21, 1983 at Smithers with 34 participants, including representatives from Dept. of Fisheries and Oceans and Protection Branch. Guest speaker Peter Murtha, University of B.C., discussed the use of colour infrared photography to detect beetles in recently attacked trees.

Views of Forest Service and industry responsibilities in pest management were discussed. The status of the bark beetle control program was presented. Forest district and industry representatives reported current pest situations and outlined their participation in the 1983-84 pest detection and control program.

The meeting also addressed specific problems and made recommendations to be addressed prior to the next meeting. Prince Rupert Forest Region holds two meetings each year in the spring and fall.

- V. Barge, Prince Rupert Forest Region, Smithers

Bark Beetle Pheromone Seminar. Morice Forest District conducted a seminar on the use of pheromones for bark beetle control on October 20, 1983. Dr. John Borden, Professor, Simon Fraser University, led the discussion on the practical use and limitations of pheromones. The meeting was well attended by Forest Service and industry representatives. Proposed plans for the use of pheromones within the Morice Forest District were discussed and evaluated. This type of seminar was viewed as an excellent means of implementing "new tools" like pheromones.

- V. Barge, Prince Rupert Forest Region, Smithers

Root Rot Workshop. A root rot workshop and training seminar was held in Smithers on September 28-30, 1983. Thirteen Forest Service Silviculture and Protection resource officers and Regional staff attended. The workshop was conducted by J. Beale, Pathologist, Vancouver Forest Region. The workshop included classroom and field instruction in the use of the root disease survey system to identify and record root rots and discussion of management control options. Participants were enthusiastic and they will be presenting a similar course in each of their respective districts to all "first entry" field staff including industry representatives.

This workshop-seminar demonstrated the need for inter-regional training assistance by qualified personnel. This type of exchange should facilitate the implementation of practical survey methods on a Province-wide basis.

- V. Barge, Prince Rupert Forest Region, Smithers

Canada-B.C. Herbicide Sub-committee. On June 7, 1983, a Memorandum of Understanding on Herbicide Research and Development was signed between the Ministry of Forests (W. Young) and the Canadian Forestry Service (R. Macdonald of PFRC, R. Green of FPMI).

In the agreement, a herbicide research and development sub-committee (working group) was established under the terms of reference for the Canada-British Columbia Joint Forest Research Committee (CBCJFRC). This special team is responsible for preparing a problem analysis identifying the needs, priorities and primary thrusts of a cooperative research, development and demonstration program to support the use of herbicides in B.C. forest vegetation management.

Sub-committee members H. Benskin (MOF Research Branch, Chairman), R. DeBoo (MOF Protection Branch), J. Boateng (MOF Silviculture Branch), D. Handley (MB, COFI rep.), J. Manville (CFS), A. Gardner (CFS), and C. Edwards (CFS) are presently drafting the problem analysis and expect to complete the report in early 1984. A project group will then be established by CBCJFRC to implement a cooperative program of research, development and demonstration.

For further information, please contact the Chairman, H. Benskin at 387-3179.

- H. Benskin, Research Branch, Victoria

Spruce Weevil Workshop, U.B.C. Research Forest, Nov. 1983. An informal workshop on the University of B.C. Research Forest was organized to discuss management of sitka spruce under deciduous overstory: an opportunity to minimize impact of sitka spruce weevil. Participants included representatives from University of B.C., Simon Fraser University, Pacific Forest Research Centre and B.C. Ministry of Forests (Protection Branch, Vancouver and Prince George Regions, and Duncan District) with Dr. J. McLean (University of B.C.) as chairman.

After the group toured a plot of 20 year old, weevil-attacked sitka spruce and an experimental plot of young sitka spruce planted under an overstory of

alder, the afternoon was spent discussing the potential use of overstory trees as a protection for spruce plantations.

The meeting concluded with the following recommendations: Proposed overstory evaluation experiments should be reviewed by a selected committee; a search should be made for acceptable nursery-crop species, and the economic justification for this potential silvicultural regime should be carefully considered.

- P.M. Wood, Vancouver Forest Region, Burnaby

Meetings in the Nelson Region. Several meetings were held in the Nelson Forest Region in 1983 including: East Kootenay Insect and Disease Control Committee at Cranbrook, March 24; Interagency Mountain Pine Beetle Technical Committee at Fernie, October 3-4; Crestbrook Forest Industries and Ministry of Forests meeting on spruce beetle impact on the multiple resources of Kianuko Creek, August 16; an advisory meeting on Douglas-fir tussock moth at Rock Creek, July 19; and a spruce beetle seminar with Districts, B.C. Timber and Slocan Forest Products, August 11.

- E. Morris and D. Gray, Nelson Forest Region, Nelson

Research Seminars on Pest Management. The current Biometrics Seminar series emphasizes the methodology involved in pest and disease impact evaluation. To date, subjects discussed included:

i) Stem analysis studies for pest impact evaluation (September 21, 1983) conducted at the Pacific Forest Research Centre to evaluate the impact of western spruce budworm, hemlock dwarf mistletoe and mountain pine beetle. A new microcomputer-based data acquisition system and some new approaches to pest impact estimation based on stem analysis were described. Within-stand variability indicated by the stem analysis studies were discussed in relation to stand sampling, and the importance of pest impact figures in the preparation of pest management guidelines was outlined.

ii) Some sampling characteristics of bark beetle populations (October 19, 1983) explored the within-tree density gradients of attacks, egg galleries and bark beetle brood stages. The shape, size and orientation of an efficient bark sampling unit was discussed in relation to the spatial arrangement of egg galleries, method of sampling unit extraction and tree size. Two sampling techniques were discussed for estimating absolute population levels: one for the mountain pine beetle in lodgepole pine and the other for the spruce beetle in logging residue.

Future seminars will deal with the Vancouver Region root disease survey (December 7, 1983) and features of insect pest models (January 11, 1984).

Further information and seminar notes (if available) can be obtained from Val Fletcher.

- V. Fletcher, Research Branch, Victoria

TABULATIONS AND GRAPHICS

FOREST PEST REVIEW COMMITTEE
MEMBERSHIP LIST
(October 1983)

NAME	MAILING ADDRESS	REPRESENTING	PHONE NO.
W. Young (Bill) (Chairman)	Ministry of Forests 1450 Government Street Victoria, B.C. V8W 3E7	---	387-3912
D. Summers (Don) (Secretary)	Silviculture Branch Ministry of Forests 1450 Government Street Victoria, B.C. V8W 3E7	---	387-1191
N. Alexander (Norm)	B.C.I.T. 3700 Willingdon Avenue Burnaby, B.C. V5G 3H2	B.C. Technical Schools	434-5734
D. Baxter (Dave)	Clearwater Timber Products P.O. Box 9 Clearwater, B.C. V0E 1N0	Interior Lumber Manufacturers Association	674-3321
J. Borden (John)	Simon Fraser University Dept. of Biological Sciences Burnaby, B.C. V5A 1S6	B.C. Universities	291-3646
R. DeBoo (Bob)	Protection Branch Ministry of Forests 1450 Government Street Victoria, B.C. V8W 3E7	Ministry of Forests	387-5965
R.E. Flinton (Bob)	Pinette & Therrien Mills Ltd. R.R. #3, Glendale Drive Williams Lake, B.C. V2G 1M3	Cariboo Lumber Manufacturers Association	392-7191
K. Joy (Kerry)	Parks & Outdoor Recreation Division Ministry of Lands, Parks and Housing 205-633 Courtney Street Victoria, B.C. V8W 1B9	Ministry of Lands, Parks and Housing	387-5002
R. Kobylnyk (Ron)*	Pesticide Control Branch Ministry of Environment 810 Blanshard Street Victoria, B.C. V8W 3E1	Ministry of Environment *(Observing Member)	387-4321

Mailing Address: 6401 Conconi Place, Victoria, B.C. V8Z 5Z7 MOF File No: 150-30

NAME	MAILING ADDRESS	REPRESENTING	PHONE NO.
L. Kornder (Lee)	Occupational Health Division Ministry of Health 828 West 10th Avenue Vancouver, B.C. V5Z 1L8	Ministry of Health	874-2331
R. Kussat (Russell)	Environmental Protection Service Kapilano 100 Park Royal West Vancouver, B.C. V7T 1A2	Environmental Protection Service	666-6711
F. Leslie (Frank)	Crown Forest Industries Ltd. Coast Wood Products Div. P.O. Box 2000 New Westminster, B.C. V3L 5A4	Council of Forest Industries	521-1941
J. Mclean (John)	U.B.C. Faculty of Forestry 270-2357 Main Mall Vancouver, B.C. V6T 1W5	B.C. Universities	228-3360
R. Morley (Rick)	Fish & Wildlife Branch Ministry of Environment 780 Blanshard Street Victoria, B.C. V8W 2H1	Ministry of Environment	387-1493
B. Nordman (Brian)	Northern Interior Lumber Sector 803-299 Victoria Street Prince George, B.C. V2L 2J5	NILS Council of Forest Industries	564-5136
C. Perry (Clay)	I.W.A. 5th Floor 1285 West Pender Street Vancouver, B.C. V6E 4B2	International Woodworkers of America	683-1117
A. Van Sickle (Alan)	Pacific Forest Research Centre 506 West Burnside Road Victoria, B.C. V8Z 1M5	Canadian Forestry Service	388-3811
P. Warrington (Pat)	Aquatic Studies Branch Ministry of Environment 765 Broughton Street Victoria, B.C. V8W 1E2	Ministry of Environment	387-4441

PRINCE RUPERT FOREST REGION

SUMMARY OF 1983 "CURRENT" SPRUCE AND PINE

BARK BEETLE ATTACK - NOVEMBER, 1983

	Existing Vol.	Infestation Ha.	Planned Logging Vol.	Ha.	Unsalvageable Losses Vol.	Ha.	Projected Infest. Vol.	Ha.	Avail. AAC (Vol.)	Mill Cap. Vol.	Vol. at Risk	Years of A.A.C.
Lakes	1 286 460	4,407	967,404	3,570	207,837	800	319,056	837	1,484,000	2,220,000	9,459,000	6.3
Morice	2,426,247	8,664	850,000	3,025	342,750	978	3,136,247	11,201	2,287,000	2,059,000	21,081,000	10.5
Bulkley	2,177,450	7,175	547,340	1,789	555,000	1,963	1,438,350	4,876	432,000	870,000	5,326,000	8.2
Kispiox	573,500	1,950	369,700	1,244	145,000	530	232,000	800	707,000	625,000	5,217,000	7.4
Kalum	2,709,310	7,740	400,000	1,141	100,000	285	2,697,195	7,705	2,285,450	1,275,000	6,755,690	3.0
	9,172,967	29,936	3,134,444	10,769	1,350,587	4,556	7,822,848	25,419	7,200,450	7,049,000	47,838,690	

- V. Barge, Prince Rupert Forest Region, Smithers

STATUS OF PRINCE GEORGE FOREST REGION BARK BEETLE MANAGEMENT PROGRAMMES - 1983

	FOREST						DISTRICT		
	PG West 1	PG East 2	McBride 3	Vanderhoof 4	Ft. St. James 5	Mackenzie 6	Dawson Creek 7	Ft. St. John 8	Ft. Nelson 9	Totals
Area Infested by Bark Beetles (ha)	974	41 500	3 500	Some scattered infestations throughout District	8 505	6 178	2 502	Some scattered infestations in south part of District	No known infestations	63 159
Area Harvested Within Bark Beetle Areas (ha)	1 012	20 000	460		2 800	994	1 379			26 645
Area (ha) Planned for Harvest Within										
1 Year	662	18 200	200		2 800	1 848	1 295			25 005
2 Years	--	10 000	300		2 200	1 070	850			14 420
3 Years	--	10 000	300		1 900	1 154	--			13 354
Area "Lost" (ha) Inaccessible or "Non-Merch"	320	2 000	2 500		2 500	?	357			7 677
Volume Infested by Bark Beetles (m^3)	114 550	9 500 000	840 000		2 725 000	1 853 400	750 600			15 958 100
Volume Harvested Within Bark Beetle Areas (m^3)	399 750	5 000 000	115 000		882 000	298 200	455 150			7 150 100
Volume (m^3) Planned for Harvest Within										
1 Year	182 500	4 550 000	55 000		771 750	554 500	388 500			6 502 150
2 Years	--	2 500 000	90 000		661 500	321 000	255 000			3 827 500
3 Years	--	2 500 000	90 000		551 250	346 200	--			3 487 450
Volume "Lost" (m^3)	96 000	400 000	540 000		787 500	?	107 100			1 930 600
Trap Tree Patches Last Season (No.; Volume; No. Trees)	13;396;330	24;7000;8235	6;1020;1200	0	1;30;35	21;1920;2260	59;3000;3530	0	0	124;13336;15590
Trap Tree Patches Planned (No.; Volume; No. Trees)	0	50;7000;8235	6;1000;1175	0	15;255;300	0	0	0	0	71;8255;9710

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

ESTIMATES OF CONTROL ACTIVITIES FOR SPRUCE AND MOUNTAIN PINE BEETLE INFESTATIONS IN THE KAMLOOPS FOREST REGION
April to October 1983

Control	DISTRICT																	
	Kamloops		Clearwater		Merritt		Lillooet		Penticton		Vernon		Salmon Arm		Totals	
	MPB[3]	SB[4]	MPB	SB	MPB	SB	MPB	SB	MPB	SB	MPB	SB	MPB	SB	MPB	SB
1) Harvesting (Infestations)[1]																
Area infested (ha)	200	150	150	650	5000	1000	3000	150	3000	10	210	458	1780	101	13,140	2,519
Area harvested (ha)	200	300	100	300	1800	400	870	110	700	0	60	139	18	0	3,748	1,249
Area to be harvested (ha)	Nil	150	20	200	2600	550	1000	10	3000	10	71	299	1762	101	8,453	1,320
Area lost - inaccessible (ha)	Nil	0	30	150	600	50	1130	30	100	0	35	10	0	0	1,895	230
2) Volume (Infestations)[2]																
Harvested (m^3) (thousands)	5	90	25	90	540	160	174	38	10	0	11	32	3	30	768	360
Lost (m^3) (thousands)	Nil	Nil	7	45	90	10	282	10	20	0	5	1	0	0	127	67

[1]Area in hectares

[2]Volume in cubic metres

[3]Mountain Pine Beetle

[4]Spruce Beetle

N/A - Not available. (Data being compiled.)

The data represented here are estimates.

- R. Edward, Kamloops Forest Region, Kamloops

PEST MANAGEMENT AIRCRAFT UTILIZATION IN 1983

	Vancouver				Prince Rupert				Prince George				Kamloops			
	Fixed Wing Hrs	Fixed Wing Cost	Rotary Wing Hrs	Rotary Wing Cost	Fixed Wing Hrs	Fixed Wing Cost	Rotary Wing Hrs	Rotary Wing Cost	Fixed Wing Hrs	Fixed Wing Cost	Rotary Wing Hrs	Rotary Wing Cost	Fixed Wing Hrs	Fixed Wing Cost	Rotary Wing Hrs	Rotary Wing Cost
Pesticide Application																
Insecticide	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Herbicide	-	-	20.2	10,523	-	-	-	-	-	-	15.7	7,577	-	-	-	-
Forest Pest Surveys	5.9	699	2.2	1,050	61.7	12,650	-	-	21.1	4,740	5.7	2,138	-	-	26.8	10,218
General Reconnaissance	-	-	-	-	-	-	-	-	15.2	3,104	8.2	4,138	3.4	408	7.3	3,389
Beetle Operations	12.1	3,327	-	-	-	-	24.8	11,150	-	-	9.2	3,972	-	-	-	-
TOTAL	18	4,026	22.4	11,573	61.7	12,650	24.8	11,150	36.3	7,844	38.8	17,825	3.4	408	34.1	13,607

- J. Morrison and S. Taylor, Protection Branch, Victoria, and Regional Air Coordinators

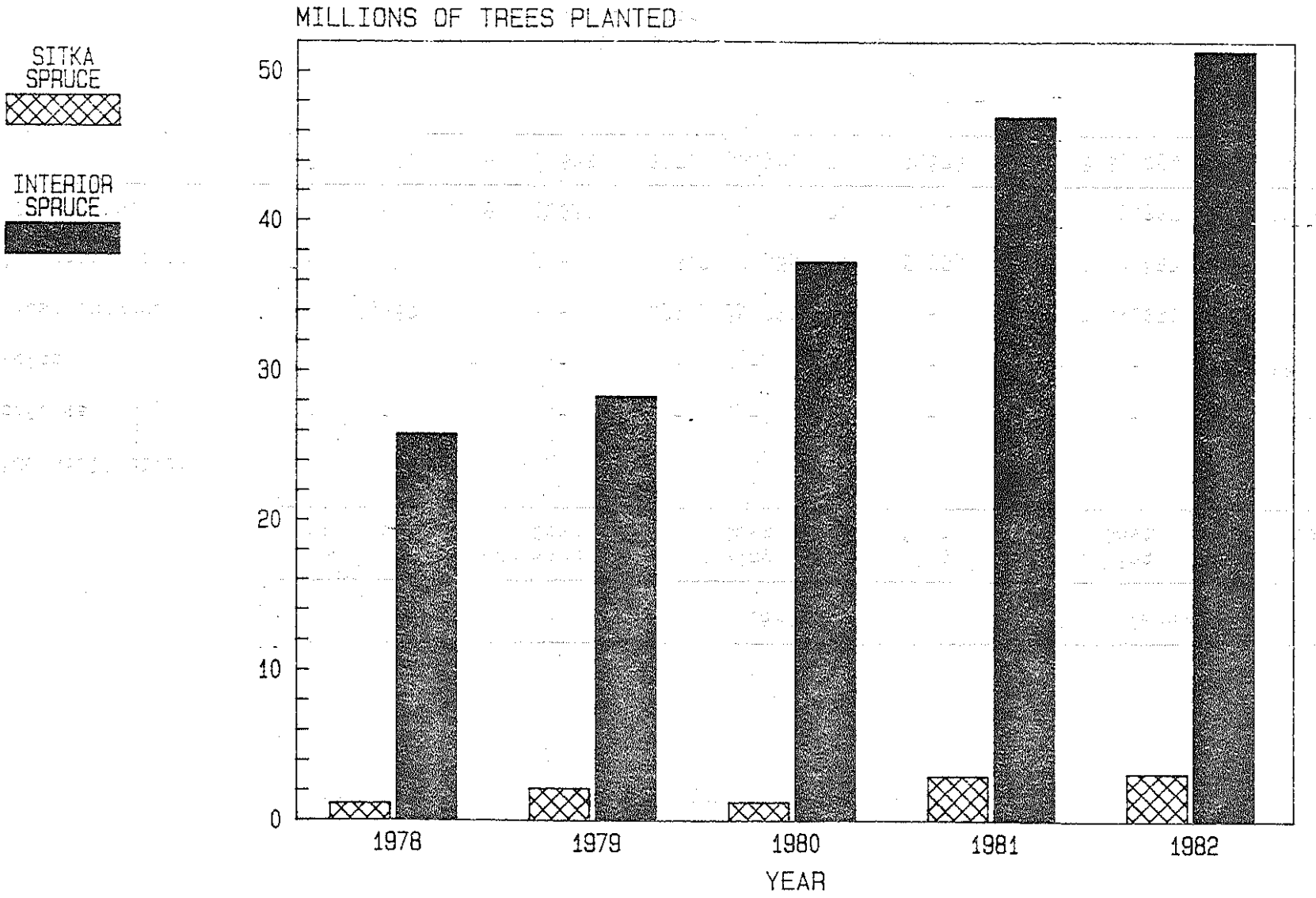
PEST MANAGEMENT AIRCRAFT UTILIZATION IN 1983 (continued)

	Nelson				Cariboo				Total (Province)			
	Fixed Wing		Rotary Wing		Fixed Wing		Rotary Wing		Fixed Wing		Rotary Wing	
	Hrs	Cost	Hrs	Cost	Hrs	Cost	Hrs	Cost	Hrs	Cost	Hrs	Cost
Pesticide Application												
Insecticide	-	-	-	-	-	-	-	-	-	-	-	-
Herbicide	-	-	-	-	-	-	-	-	-	-	35.9	18,100
Forest Pest Surveys	28	7,460	-	-	291.5	35,721	-	-	408.2	61,270	34.7	13,406
General Reconnaissance	-	-	-	-	5.9	985	13.2	5,953	24.5	4,497	28.7	13,480
Beetle Operations	-	-	11.9	5,623	-	-	3.8	1,921	12.1	3,327	49.7	22,666
TOTAL	28	7,460	11.9	5,623	297.4	36,706	17	7,874	444.8	69,094	149	67,652

- I. Morrison and S. Taylor, Protection Branch, Victoria, and Regional Air Coordinators

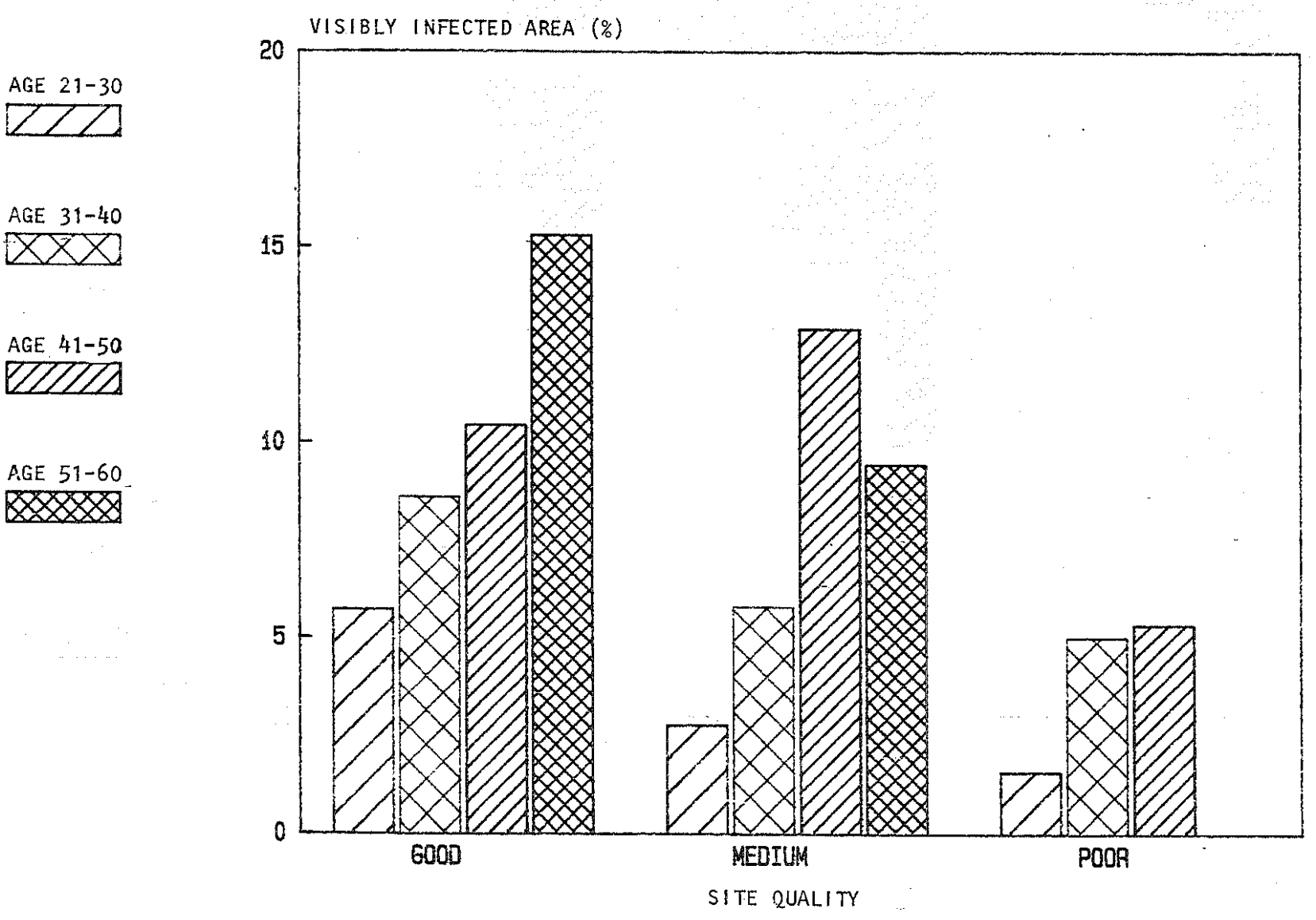
SPRUCE PLANTATIONS IN B.C.

1978 TO 1982

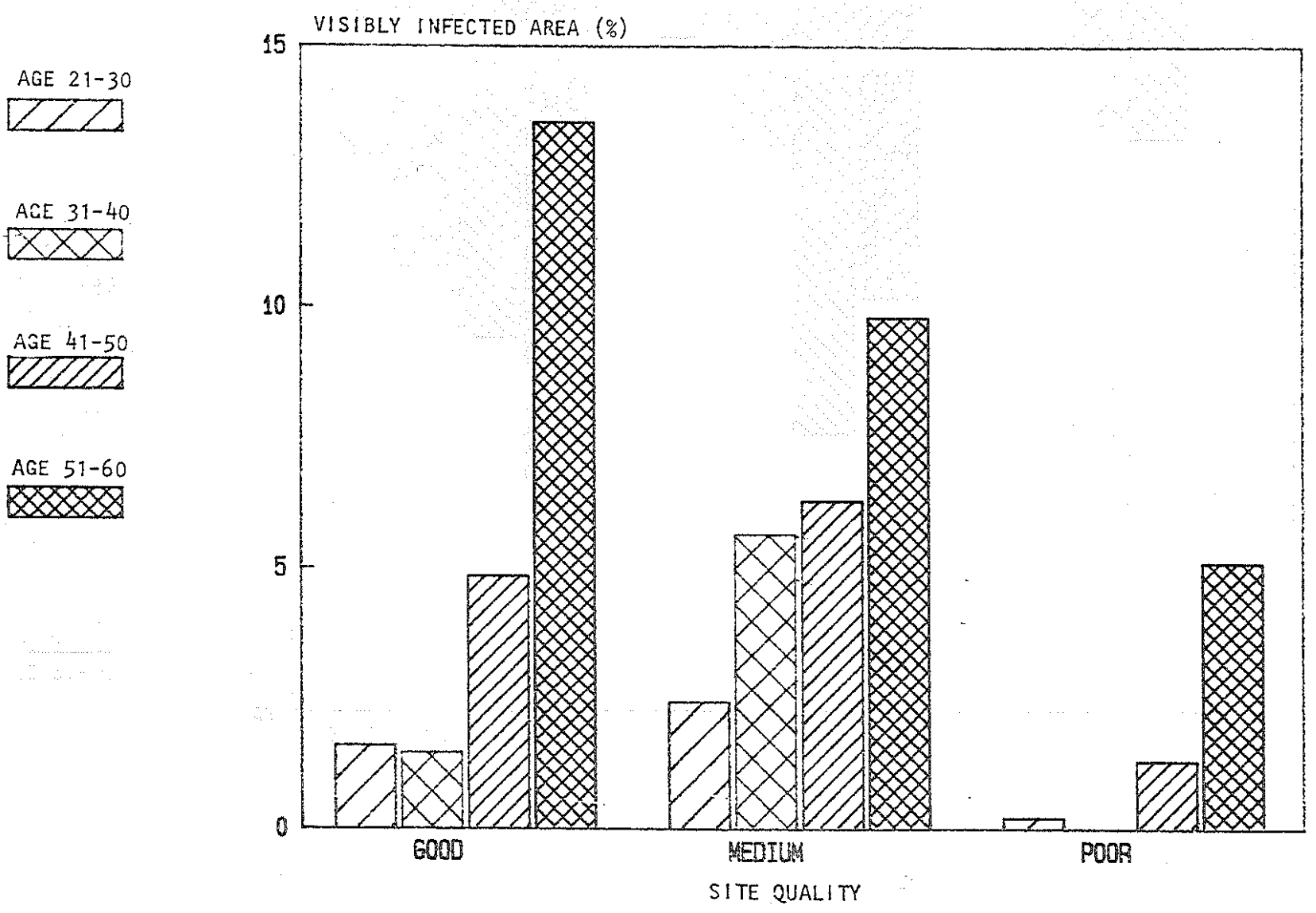


REFERENCE: SPECIES ANNUAL PLANTING REPORT - PROVINCIAL SUMMARY.
SILVICULTURE BRANCH, MINISTRY OF FORESTS 1978-1982 INCLUSIVE

- P. Humphreys, Protection Branch, Victoria



- J. Beale, Vancouver Forest Region, Burnaby



- J. Beale, Vancouver Forest Region, Burnaby

AERIAL APPLICATIONS OF INSECTICIDES IN B.C. FORESTS 1929-1982[1]

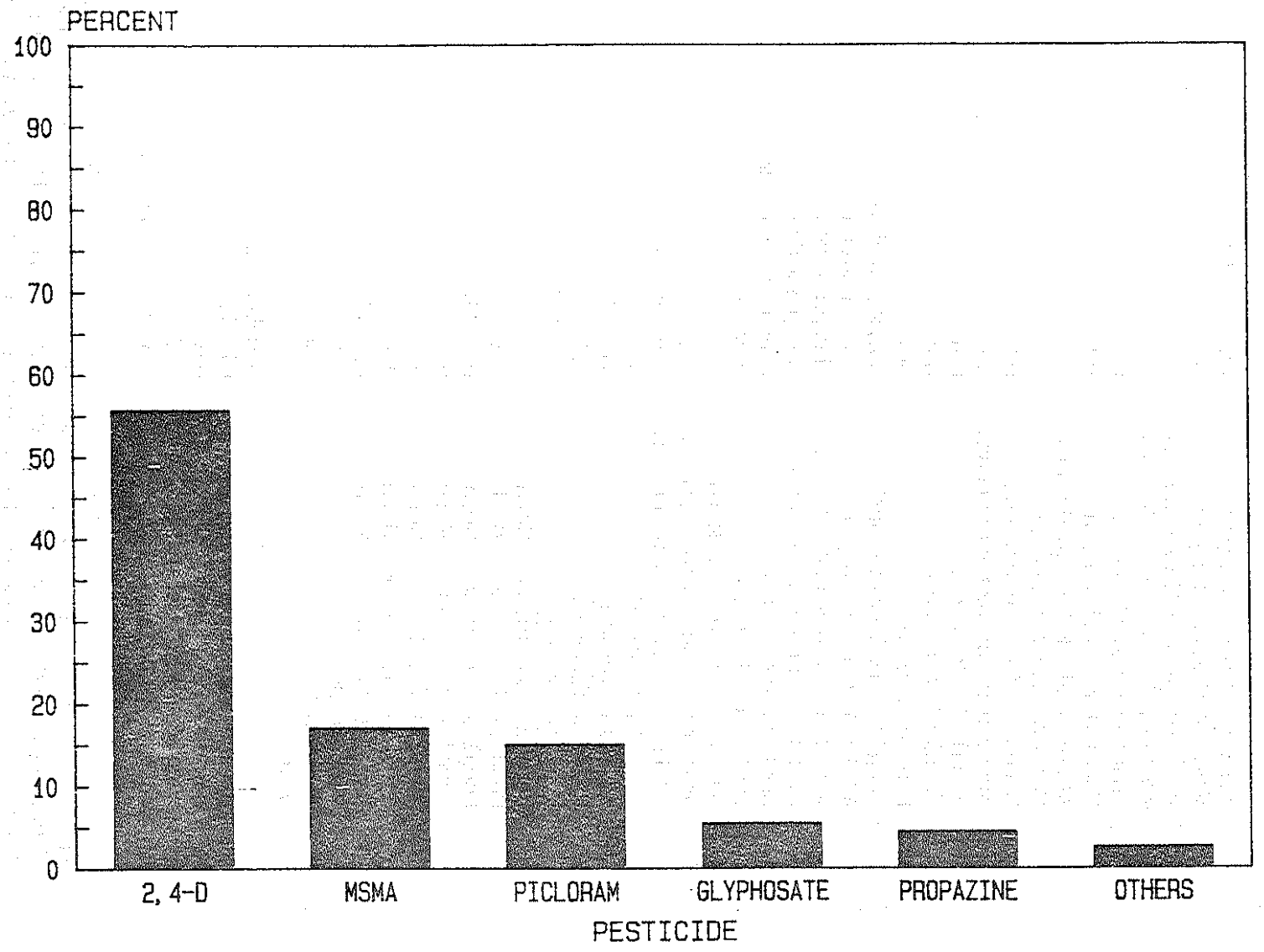
YEAR	INSECT	INSECTICIDE	HECTARES
1929	Western Hemlock Looper	Calcium Arsenate	20R
1930	Western Hemlock Looper	Calcium Arsenate	650
1946	Western Hemlock Looper	DDT	5 100
1948	Western False Hemlock Looper	DDT	5 000
1956	Western Black Headed Budworm	DDT	100R
	Phantom Hemlock Looper	DDT	80
1957	Phantom Hemlock Looper	DDT	100
	Western Black Headed Budworm	DDT	63 000
1959	Western Hemlock Looper	DDT	220
	Green Striped Forest Looper	DDT	220
1960	Western Black Headed Budworm	DDT	12 700
	Saddle Back Looper	DDT	730
1961	Saddle Backed Looper	DDT	4 300
	Pine Butterfly	DDT	600
1962	Douglas-fir Tussock Moth	DDT/Malathion	16R
1963	Western Hemlock Looper	Phosphamidon	20R
1964	Western Hemlock Looper	Phosphamidon	20R
	Green Striped Forest Looper	Phosphamidon	650
1965	Hemlock Needle Miner	Phosphamidon/Dimethoate	40R
1971	Cone/Seed Insects	Dimethoate	20R
1972	Douglas-fir Tussock Moth	NPV	2R
1973	Western False Hemlock Looper	B.t.	160R
	Western Black Headed Budworm	Fenitrothion	11 600
1974	Nepytia freemani	B.t.	16R
	Nepytia freemani	Altosid 5E	16R
1975	Nepytia freemani	B.t.	160R
	Nepytia freemani	Acephate	70R
	Douglas-fir Tussock Moth	B.t.	12 600
	Douglas-fir Tussock Moth	NPV	1 000
	Douglas-fir Tussock Moth	Dimilin	200
	Douglas-fir Tussock Moth	Acephate	200
	Douglas-fir Tussock Moth	B.t.	800
	Douglas-fir Tussock Moth	Acephate	10 200
	Douglas-fir Tussock Moth	Dimilin	200
	Western Budworm	NPV	20R
1978	Western Budworm	NPV	60R
	Western Budworm	B.t.	160R
	Spruce Seed & Cone Insects	Dimethoate	3R
1979	Spruce Seed & Cone Insects	Dimethoate	10R
1981	Douglas-fir Tussock Moth	NPV	20R
1982	Douglas-fir Tussock Moth	NPV	40R
	Western Budworm	NPV and Granulosis Virus	340R

[1] Information to 1973 compiled from Prebble, M.L. 1975, Aerial Control of Forest Insects in Canada. Information following 1973 provided by the Canadian Forestry Service. Approximately half of the aerial insecticide treatments were conducted for research purposes. Abbreviations are: NPV - nuclear polyhedrosis virus; Bt - Bacillus thuringiensis; R - Research. Nepytia freemani is a looper pest of Douglas-fir and closely related to both the False Hemlock and Phantom Hemlock Loopers.

- J.F. Henigman, Protection Branch, Victoria

PERCENT PESTICIDE USE BY AREA TREATED

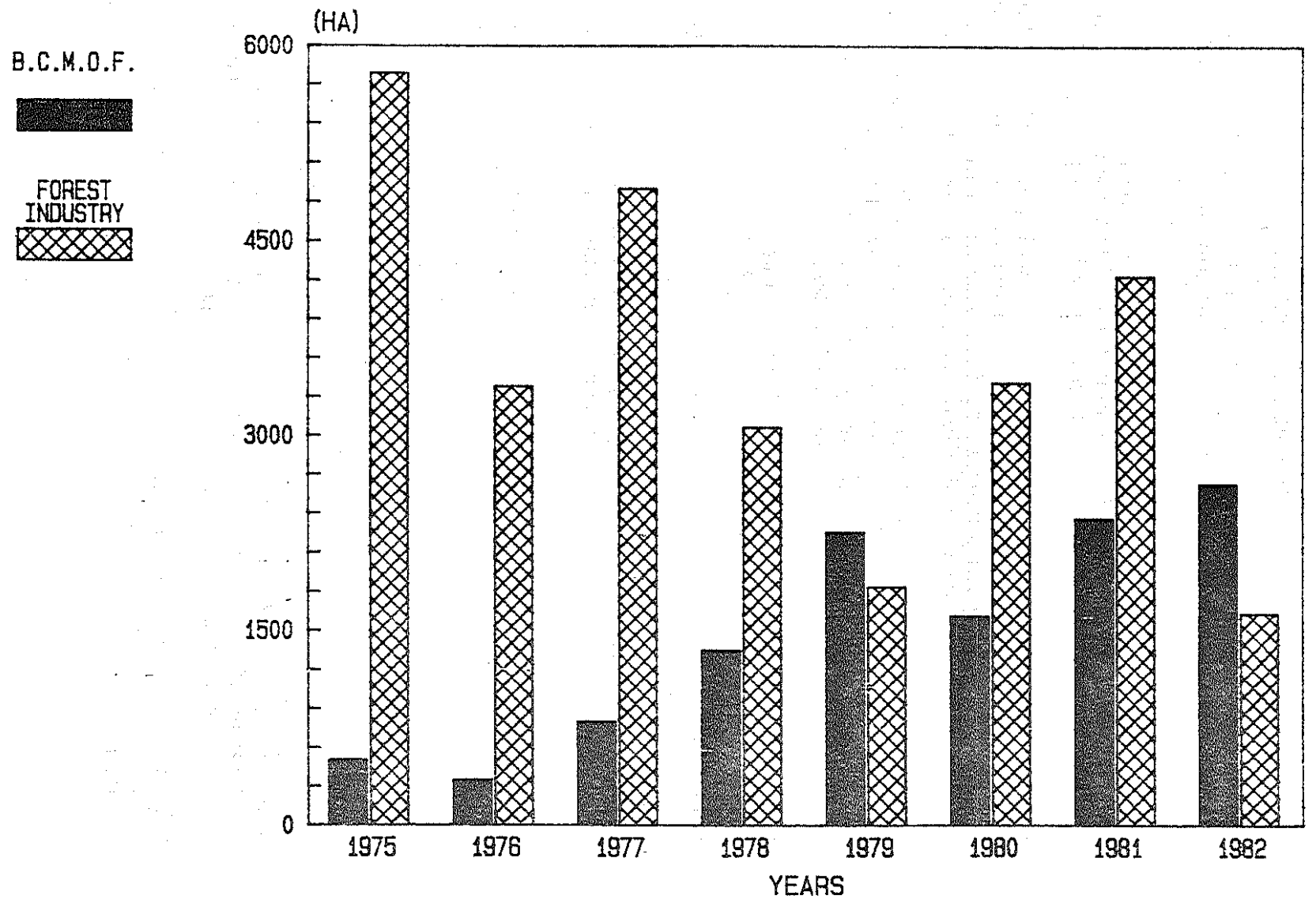
1982



Prepared by P. Humphreys and J. Henigman, Protection Branch, Victoria

TOTAL HECTARES OF LAND TREATED WITH HERBICIDES FOR FORESTRY PURPOSES

1975 - 1982



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Nelson Pest Management File Reports. Recent file reports prepared in the Nelson Forest Region include:

1. Kootenay Lake Forest District Five Year Pest Management Plan 1982-83 to 1987-88 by M. Pascuzzo.
2. The Western False Hemlock Looper in the Invermere TSA by E. Begin.
3. Experimental Aerial Extraction of Mountain Pine Beetle Infested Lodgepole Pine by R. Stewart and L. Price.

- E. Morris, Nelson Forest Region, Nelson