



Province of
British Columbia
Ministry of
Forests

PEST MANAGEMENT PROGRESS

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

Volume IV, Number 1 (File: 190-4 PMP)

May 1985

ATTACK ON THE BEETLES

At the Symposium on Mountain Pine Beetle at Smithers last month, it was crystal clear that forest pest management has moved rapidly from the skid trail to the forestry highway in British Columbia. Most of the intense discussion there, whether of biology, detection, control, or economics, dealt with activities to prevent or suppress damage by this pest. This dramatic shift from habitual discussion of philosophical aspects and dissertations on research is directly related to the arrival and involvement of experienced specialists with forest companies and the B.C. Forest Service who are actually doing forest pest management here. Events such as the operations-oriented Smithers symposium, and the growing support of government and industry - as well as the unavoidable trickle of complaints - confirm the dawning of this new era. We believe it is with a large degree of relief and satisfaction that colleagues in research experience this transition. And this shift could not have been accomplished without the support of that persistent and vocal few.

During fiscal 1985-86, about \$7 million will be dedicated to the management of spruce and mountain pine beetle alone. This allotment follows a \$5 million start-up commitment last year. Barring fiscal catastrophe, it will likely be followed by continued funding during the balance of the first 5-year provincial beetle management program. Our challenge will be to spend this money wisely at every appropriate opportunity to sanitize, trap, redirect, and augment harvesting activities against the beetles. Long-term planning, methods to appraise the effectiveness of programs, methods to better express impact, and the continuous insertion of new strategies are all included in this B.C. forestry initiative.

Our confidence is high because of the resident capability to support these efforts: First, we anticipate more world-class innovation and direct transfer from the research and development community; we anticipate significant new support for key personnel with forest companies and at District offices of the Forest Service, i.e. at the front line; and for the first time in Canada, professional forest entomologists will operate at the Regional level. All of this signifies the solid commitment at hand and the unique opportunities ahead to practice progressive forest pest management in B.C.

- 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.

EDITOR'S THANKS TO CONTRIBUTORS. Production of this and previous issues of Pest Management Progress has been possible only because of the excellent support by contributors, and extra assistance by Branch staff. Your efforts have resulted in several compliments that this publication is very valuable for keeping Ministry staff and others informed and up-to-date.

I particularly thank those contributors who have submitted articles in the required format and in time to meet our deadline for typing and printing. In view of the increasing demands on our time and greater complexity of pest management work, your continuing support will be required for our new editor, Peter Hall, who will assemble the next four issues.

- J. Muir, Protection Branch, Victoria

PEST MANAGEMENT GENERAL

Powell River Forestry Update '85. District Manager Barry Mountain and staff provided a unique opportunity for residents of the area to meet Forest Service personnel and discuss local forestry operations. Presentations by staff summarizing various aspects of harvesting, inventory, protection, silviculture, recreation, and engineering were well received. Information booths, including one on forest pest management manned by Ron Diprose, provided the audience additional opportunities to ask questions and gain understanding of various policies and operational procedures. Post-event press coverage and critiques suggested that this effort was very worthwhile. Andy Byrne, representing the Upper Sunshine Coast Lumberman's Association, in a letter to the Powell River Town Crier, wrote "There must be more of this kind of information-sharing in the future for a better understanding of how we all fit into the very large forest picture. We wish to give credit where credit is due for a job well done."

- R. DeBoo, Protection Branch, Victoria

Pest Management Displays. During the past year, pest management displays have been prepared and presented at many locations in southern B.C. The display, comprised of eight panels mounted in an aluminum fast-fold frame, is available to regional and district office personnel and to associations or groups interested in forest pest management. Presentations are available on:

- Forest Pest Management
- Douglas-fir Tussock Moth
- Pesticides
- Mountain Pine Beetle

If funds are available, we intend to produce an additional display on root disease. Handout literature and specimens are available also to augment these various presentations. Contact us should additional information be required.

- R. DeBoo and S. Taylor, Protection Branch, Victoria

Recommended Common Names. Two new publications are recommended to Forest Service staff as approved references for common/scientific names of insects and disease organisms. Copies of the "Nomenclatura Insectorum Canadensium" are available free of charge from:

Dr. Paul Benoit
Laurentian Forest Research Centre
P.O. Box 3800
Ste. Foy, Quebec
G1V 4C7

Copies of the Western International Forest Disease Work Conference "Common Names for Tree Diseases in the Western United States and Western Canada" are available for \$1.00 (U.S.) from:

Dr. Ken Russell
Washington Department of Natural Resources
Public Lands Building
Olympia, Washington
U.S.A. 98504

- R. DeBoo, Protection Branch, Victoria

Improving Pest Surveys. Staff at Protection Branch, with input from Regional specialists, will be working with colleagues of the Forest Insect and Disease Survey of the Canadian Forestry Service to improve working relationships and to streamline efforts. The group will be known as the "Forest Pest Survey Committee" under terms of reference agreed to in 1984. Long term goals will include improvement in survey methods and refinement of operations and working relationships.

- R. DeBoo, Protection Branch, Victoria

Estimates of forest insect and disease losses in B.C. Timber Supply Areas. This project, also known as the "black book" exercise, is a compilation of estimated pest losses in each Timber Supply Area of the Province. On March 20, 1985, the Planning and Inventory - Protection task force finalized the objectives and methods for the project. Objectives include determination of:

- opportunities for salvage of tree mortality
- unsalvageable mortality losses
- potential gains in productivity by treatment of "growth-loss" pests, for example, dwarf mistletoe

The basic goals of the project are to focus on current estimates of pest losses, methodology and information requirements. These estimates are intended to facilitate the development of TSA plans; establishment of priorities for management, research and development; and analyses of yields and allowable annual cuts for each TSA.

The next phase of the project will be to calculate and compile estimates for each TSA by regional pest management and planning staff meeting in Victoria in May to June. The project and a final report should be completed by July, 1985.

- S. Taylor, Protection Branch, Victoria

Protection Research Plots. Two "Protection Research Plots" have been registered officially by the Status Section of the Timber Administration Branch. These plots, and three additional plots that have been requested for official status, are all being reserved for long-term monitoring of white pine pruning as a method to prevent blister rust (Cronartium ribicola) infection of western white pine.

- P. Wood, Vancouver Forest Region, Burnaby

Pest Management Programs in B.C. Forest Service Seedling Nurseries. The range of chemicals that are registered for use on conifer seedlings in Canada is limited. Work to gain label extensions through the minor use registration program will be emphasized over the next few years.

Gray mold (Botrytis cinerea) continues to be an important problem on container seedlings. During the fall of 1984 a survey of both provincial and private nurseries was conducted to assess the tolerance of Botrytis to the commonly used fungicides. A high level of tolerance to some fungicides was found.

For the summer of 1985 a contract has been arranged through the Pacific Forest Research Centre to test six new fungicides for Botrytis control. It is hoped that registering a wider range of pesticides and using them in rotation will help prevent the build-up of tolerant strains.

In the summer of 1984, damage from the Lygus bug at several nurseries in the Prince George area was not as extensive as 1983. Coloured sticky traps used to monitor Lygus populations were not effective. Caging studies confirmed the type of damage produced by adults. In summer 1985, seven insecticides will be screened at Red Rock Nursery for control of Lygus bug and to determine their phytotoxicity to conifer seedlings.

The Ministry of Forests initiated a new program of producing two year-old container seedlings. Several pests are expected to become problems as a result of this new culture. A trial to determine the effectiveness of Equal (dodine) to control liverworts and phytotoxicity to conifer seedlings will be conducted at Green Timbers Nursery. A trial using Virtuss to control populations of the Rusty tussock moth Orgyia antiqua will be conducted on container stock at Surrey Nursery in conjunction with Dr. I. Otvos, Pacific Forest Research Centre.

- G. Shrimpton, Surrey Nursery, Surrey

Pest Management Section 88 Projects in the Vancouver Region. Several pest management projects undertaken by forest licensees and funded by credits to stumpage (Section 88) were completed in the Vancouver Forest Region in the 1984-85 fiscal year. These included: sitka spruce weevil surveys (4 projects) and clipping (5 projects); white pine pruning (2 projects); pest detection flight; a root disease survey; and a hemlock dwarf mistletoe control project.

- D. Heppner, Vancouver Forest Region, Burnaby

Merritt Pest Management Highlights. Projects planned or completed recently include:

- a knapweed-range coordinated spray program covering 53 ha
- colour photography by a forest licensee to assist detection of mountain pine beetle and layout of ground probe surveys and control areas
- experimental pesticide trials with Sevin SL and MSMA to mop up mountain pine beetle were very successful and operational trials are planned for 1985. A report is being prepared
- an extensive pheromone baiting program for mountain pine beetle and spruce beetle is scheduled for spring, 1985 to compliment proposed harvest plans

- T. Lacey, Merritt Forest District, Merritt

Pest Management in the Nelson Region. The main emphasis of the pest management program in the Nelson Region is detection and control of bark beetles, dwarf mistletoe and root disease. Bark beetle control is primarily being addressed through prioritized harvesting of infested stands and trap trees, pheromone containment, and cut and burn programs in spot infestations. Dwarf mistletoe and root disease infected stands are being treated through harvesting and silvicultural treatments.

- E. Morris, Nelson Forest Region, Nelson

Update on Introduction of Fisher as a Biological Control for Porcupine in the North Coast District. Since the last report in Nov. 84, the program suffered a minor setback. Although twelve fishers were to be trapped, only five were captured, and two died and one escaped, so we ended up with only one male and one female.

These two animals were released in the project area on February 26 after receiving radio implants. During the operation it was determined that the female was pregnant with a litter of three.

The importance of the radios became very evident shortly after release. Both animals travelled to the nearest height of land immediately after their

release and settled in to their new territory. The male ranged only a very short distance over the next two months. However, the female, after four days, travelled 18 km to an entirely different inlet, reportedly a behavioral pattern not uncommon when preparing to whelp. We believe she has now had her litter as she has not left the immediate area for over a month.

Ground checks to determine whether they are actually preying on porcupine have not been made. However, both have established territories in heavily infested porcupine areas and considering their propensity, we assume they are.

Arrangements have been made with a group of trappers in the Williams Lake area to purchase another ten fishers this fall. The project should be successful as there will be a number of trappers, instead of just one, capturing them.

Porcupine damage surveys again done this spring, revealed that another 5.1% of the hemlock and 1.1% of the sitka spruce were attacked this past winter. These results, plus survey results from last year which indicated 1.5% newly damaged hemlock and 1.3% damaged spruce, indicated the necessity for a porcupine control program.

- W. Jackson, North Coast Forest District, Prince Rupert

Economic Decision-making in Pest Management. The following is a brief introduction to pest management economics from an operational viewpoint.

The potential economic impacts of forest pests are immense. Control, in some degree, is possible but expensive. Control options, of various costs and degrees of effectiveness, are available.

Consideration of these points raises two main economic questions:

1. How much money should be spent on control, overall?
2. Which control options make the best use of available money?

Answering either of these questions fully is not possible, but all of us who are involved in pest management can focus our thinking and actions by recognizing that:

1. We can only influence government decisions on the level of funding for pest management.
2. We can decide and act on what we consider to be the best use of the dollars allotted for pest management.

With these budgetary realities firmly in mind, we can make our efforts most useful (economic) in the following ways:

1. We can talk about the volume we can reasonably expect to save. Volumes "at risk" are not the main economic concern. It is the volume which can be "saved" through control efforts which counts.
2. We can do first that control option which is expected to save the most cubic metres with the fewest dollars. This is selection of operational activities on the basis of expected cost-effectiveness (lowest cost per unit of timber saved). Note that this does not involve "cost benefit analysis," which is far more complex.
3. We can try to reduce the uncertainty surrounding both the pest and controls of it, as this will help both the determination of an appropriate budget and improve the allocation of the fixed funds we have to live with.

- T. Niemann, Strategic Studies Branch, Victoria

ENTOMOLOGY

Bark Beetle Funding. Approximately \$5 million was spent in the 1984/85 fiscal year on a variety of bark beetle-related projects throughout the province. Activities included construction of access roads, aerial and ground surveys, single-tree treatments, use of semiochemicals, and others. This was the first year of a proposed multi-year program.

In 1985-86, about \$7 million has been allocated for the bark beetle program. Activities begun in the previous year of the program will be continued and new high priority projects will be undertaken. The objective of this multi-year program is to slow the rate of expansion of the bark beetle infestations and to "buy time" in which to implement more orderly management plans.

An internal report (PM-PB-15) was prepared to outline the background, objectives and activities within the program.

- P. Hall, Protection Branch, Victoria

Section 88 Guidelines for Bark Beetles. A draft outline of activities suitable for Section 88 funding for bark beetle management was circulated for comment to the regions during 1984-85. When all comments have been received and collated, this document will standardize the application of Section 88 funds for bark beetle work in coordination with other funding.

- P. Hall, Protection Branch, Victoria

Bark Beetle Special Funding in Prince George Forest Region. In the 1984-85 fiscal year, in the Prince George Forest Region, approximately \$363,527 was

spent on twenty-six projects for detection, access, monitoring and control of Dendroctonus beetles. Projects were undertaken in seven districts and have been carefully assessed and monitored by district and regional staff. A total of \$1,319,750 has been requested for twenty-seven projects under the bark beetle special funding program in 1985-86.

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

Special Funding Projects for Bark Beetles in the Vancouver Forest Region.

Four bark beetle projects funded by this program were completed in the Vancouver Forest Region. Three projects involved aerial surveys and ground probes and these will be followed by sanitation logging prior to beetle flight in the summer of 1985. The fourth project involved helicopter logging to remove infested timber in a wildlife-sensitive area.

Proposals for the 1985-86 fiscal year special funding have been submitted for surveys in the Chilliwack and Mid-Coast Forest Districts.

- P. Wood, Vancouver Forest Region, Burnaby

Lillooet Bark Beetle Projects. A special bark beetle fund project was completed last fall, with 9 km of mainline logging road built for \$105,000.

The project area, in the Upper Tyaughton Creek drainage, contains approximately 125 ha of infested lodgepole pine. The mountain pine beetle threatens a further 3800 ha of timber in this drainage.

Both small business operators and the major licensee plan to start harvesting this summer. Further funding will enable ground crews to map the current green-attack infestations. With this information, we plan to set harvesting priorities for beetle control.

Near the town of Lillooet, approximately 300 beetle-infested ponderosa pine were located and marked by district staff. An additional 15 ha infestation of Douglas-fir beetle has been put up for sale as a Douglas-fir reserve horse-logging contract, to start at the end of April. A disposal program of "cut and burn" is being carried out by a Canada Works program with district staff supervision.

- T. Fenton, Lillooet Forest District, Lillooet

Special Bark Beetle Projects in Nelson Region. In addition to the regular pest management funding, the Nelson Region received \$760,000 in special funding in 1984 for bark beetle detection and control.

Thirty-four projects were completed, which included aerial and ground detection survey for prioritizing stands for control actions, road access upgrading, new road and bridge construction, pheromone containment, trap trees and cut and burn, as shown in the summary table (Tabulations and Graphics Section).

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

Nelson Region 1985-86 Bark Beetle Projects. For the 1985-86 fiscal year, 56 bark beetle project proposals have been submitted for approval under the special bark beetle funding as shown in the following summary.

Nelson Regional Bark Beetle Proposals 1985-86

<u>District</u>	<u>No. Projects</u>	<u>Surveys</u>	<u>Access</u>	<u>Estimated Cost</u>			<u>Cut/Burn</u>	<u>Total</u>
				<u>Phero</u>	<u>Trap</u>	<u>Trees</u>		
Cranbrook	7	66,650	177,750	6,600	-	-	14,400	264,400
Invermere	10	302,000	160,000	4,500	-	-	-	466,500
Golden	5	81,860	-	-	-	-	-	81,860
Revelstoke	2	15,322	-	-	-	10,320	-	25,642
Arrow	15	55,908	12,900	800	-	-	-	69,608
Kootenay L.	6	331,305	117,500	-	-	8,500	-	457,305
Boundary	10	18,620	23,730	250	-	-	-	42,600
Region	1	-	-	-	-	-	-	23,400
Total	56	870,665	491,880	12,150	18,820	14,400	14,400	1,431,315

These activities include:

Aerial surveys of 293 000 ha of infested and susceptible pine and spruce stands. These surveys will include overview surveys using fixed-wing aircraft to sketch map all bark beetle infestations, followed by more detailed mapping using rotary-wing aircraft in areas where ground surveys and control actions are planned.

Ground surveys on 18 500 ha to prioritize areas for control-salvage harvesting, pheromone containment, cut and burn, and trap tree projects.

Road access into infested and susceptible pine and spruce stands for harvesting, including 137 km of road upgrading, new road construction and installation of nine bridges. These roads will primarily be used for the Small Business Enterprise Program to harvest stands that the major licensees are unable to address.

Harvesting priorities for an estimated 561 000 m³ of infested pine and spruce for operations over the next three years, by licensees (450 000 m³) and operators under the Small Business Enterprise Program (111 000 m³).

Pheromone baits will be used on 496 ha of small mountain pine beetle infestations prior to harvesting to contain the 1985 beetle flights.

Cut and burn of spot infestations of mountain pine beetle will be conducted to slow the spread in areas where harvesting is planned in the near future and along the B.C.-Alberta boundary where the Ministry of Forests has made a commitment to take control actions to slow the spread into Alberta and adjoining National Parks. We anticipate that 925 trees will be cut and burned at an average cost of \$15.50 per tree. In addition, 100 days of work using the Rapattack crew are planned for beetle probes, and cutting and burning of infested pine in the boundary areas.

Lethal trap trees to a limited extent will be used to control small inaccessible spruce beetle, spot infestations. Non-lethal trap trees are used as a regular part of road development and harvesting, by felling trees prior to beetle flights.

- E. Morris, Nelson Forest Region, Nelson

Special Bark Beetle Funding Projects in the Cariboo. The Cariboo Region was allocated \$1,644,000 special funding for projects to provide access or control bark beetles.

A total of 15 projects were completed in the Region. Accomplishments included: road construction of 54.6 km; road gravelling, 39.7 km; road surveys, 59 km; ground surveys, 6,000 ha; aerial surveys, 75,000 ha; 3,292 single trees disposed of; and trap trees felled in five sites. Emphasis in the Cariboo Region is to construct new access to utilize the attacked pine as well as effecting some control by removing current attack. The amount spent on access was \$1,352,000.

- D. Doidge, Cariboo Forest Region, Williams Lake

Prince Rupert Bark Beetle Control Program, 1984-85. With the allocation of \$1,288,130 special funding for bark beetle control in the Prince Rupert Region, an intensified detection and control program was successfully implemented.

Detection activities funded, or assisted, included aerial and ground surveys, colour photography and surveys also funded by credits to stumpage for licensees (Section 88) as outlined in the table "Prince Rupert Region Bark Beetle Detection Activities, 1984-85" (see Tabulations and Graphics Section).

Status of bark beetle infestations is shown in the table "Summary of bark beetle infestations, February 1985, Prince Rupert Region."

Control activities included logging and use of pheromones (see table "Bark beetle control using pheromones and logging, Prince Rupert Region"), and single-tree treatments (see table "Bark beetle control using single-tree treatments, Prince Rupert Region").

All harvesting in the Prince Rupert Forest Region is within beetle-infested timber and this allows maximum use of our mill capacity to reduce the present beetle populations. The cooperation between industry and Forest Service has been exceptional and with this spirit and continuing special funding, we should continue to reduce beetle-caused timber losses in the Prince Rupert Forest Region.

- V. Barge, Prince Rupert Forest Region, Smithers

Prince Rupert Special Bark Beetle Funding Request for 1985-86. The Prince Rupert Region requested special funding of bark beetle control projects, including the following activities:

Aerial Surveys	\$ 48,380
Colour Photography	103,500
Ground Survey and Layout	326,817
Fall and Burn	975,433
Administration	98,275
Pheromones	49,804
Roads	1,690,000
Prescribed Burn	85,000
Total	<u>\$3,377,209</u>

The requested funds for the Forest Districts are:

Lakes	\$ 266,750
Morice	669,268
Bulkley	1,974,571
Kispiox	202,225
Kalum	140,845
Region	123,550
Total	<u>\$3,377,209</u>

Because control of mountain pine beetle has the highest priority in this Region, the funding should result in a dramatic reduction of infestation, primarily by means of the fall and burn projects.

Control projects at this time should be very effective because (1) the mountain pine beetle development in the Region is out of phase due to recent

unusual weather; and (2) overwinter mortality of larvae was 73% in currently attacked trees and 86% in one year old attacked trees.

- V. Barge, Prince Rupert Forest Region, Smithers

Cariboo Region Aerial Insect Surveys. The vast mountain pine beetle infestation in the Cariboo Region made it extremely difficult to compile the area affected and calculate volume losses by November. Therefore, the table below shows the final survey figures for 1984.

Cariboo Region Bark Beetle Infestation and Losses, 1984

Lodgepole pine	405,000 ha	4,519,000 m ³
Spruce	1,400 ha	57,000 m ³
Douglas-fir	1,600 ha	14,000 m ³
Total	408,000 ha	4,590,000 m ³

- D. Doidge, Cariboo Forest Region, Williams Lake

Colour Aerial Photography for Mountain Pine Beetle Detection in the Prince Rupert Region. Colour aerial photography, covering 330 000 ha in the Prince Rupert Forest Region, was utilized in the 1984-85 mountain pine beetle detection program.

The use of 1:10,000 photography substantially reduces detection costs by eliminating aerial sketch mapping to refine the location of red attack trees and by providing for organization of probes and efficient orientation during probes.

In addition, the photography provided a permanent record of infestations that can be analysed and compared with others in the future. A full analysis of the cost effectiveness of the 1984 aerial photography and a comparison with the aerial sketch mapping option has been completed, and a report is being prepared.

Colour aerial photography will be undertaken in 1985, including an additional 120,000 ha of infestation.

- M. Larock and V. Barge, Prince Rupert Forest Region, Smithers

Mountain Pine Beetle Mortality in Prince George Forest Region. In 1984 in the Prince George Region, the flight of mountain pine beetles was delayed until late summer because of cool and wet weather in July and August. In January 1985, temperatures dropped to -44.6°C in Prince George. From field trips to

the Prince George West, Fort St. James, Mackenzie, and Vanderhoof Forest Districts, the following information was compiled (see Tabulations and Graphics Section).

Although the mean lengths of egg galleries per tree were variable from 6.1 to 37.2 cm, depending on location, only 1% of the attacked pine examined had any larvae present. All of the adult insects and 12 larvae collected and reared were dead.

Although the low success insects from the 1984 flight might reduce mountain pine beetle expansion and incursion into the Prince George Forest Region, aggressive programs of detection, semiochemical baiting, single tree disposal and logging will continue to be high priority activities in 1985.

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

Overwintering Mortality of Mountain Pine Beetle in the Cariboo. The winter of 1984-85 was long and severe, beginning in the last week of October, 1984 with an official temperature of -29°C . December had double the average snowfall and two record-setting temperatures of -43°C on December 17 and 31. On the Chilcotin Plateau, temperatures were below -50°C .

Bark beetle survival was checked at several localities with the following results:

Overwintering Mortality of Mountain Pine Beetle 1984-85

<u>Locality</u>	<u>No. Plots</u>	<u>% Mortality of Larvae</u>
Quesnel	12	96
Nazko	-	82
Williams Lake	11	86
Horsefly	22	82
100 Mile House	16	94
Chilcotin Plateau	12	76

Each plot consisted of at least five trees, each of which were sampled in four places: two above and two below the snow line. The percentage mortality was the average of all the plots.

It is expected that the mortality will not have a major adverse effect on the mountain pine beetle generally. In 1979, the beetle mortality at Tatla Lake was 98% and the spread continued unabated.

- D. Doidge, Cariboo Forest Region, Williams Lake

Overwinter Mortality of Mountain Pine Beetle in the Prince Rupert Forest Region. Surveys of populations of mountain pine beetle were conducted to determine overwinter mortality in Nov.-Dec. 1984, and in March 1985.

A cool summer resulted in a late beetle flight in 1984, and subsequent larval development was inhibited. Most of the overwintering larvae were in the first or second instar, and overwinter mortality was 73% and 86% in current and one-year old attack respectively. Mortality of adults (mostly parents) was 96% and eggs, 100%.

It is not known if these figures are significantly different from usual mortality in the Prince Rupert Forest Region. The survey will be continued in order to establish baseline data on average conditions.

- A. Stock, Prince Rupert Forest Region, Smithers

Use of Bark Beetle Semiochemicals. The use of aggregating semiochemicals to limit bark beetle dispersal out of cut blocks and as an aid in single tree treatment projects is now considered operational in mountain pine beetle management.

Approximately 35,000 baits for mountain pine beetle were purchased in the 1984-85 fiscal year, to be distributed before the 1985 beetle flight period. This approach should greatly enhance the effectiveness of control methods. It is anticipated that more baits will be used in the coming year.

Trials are being conducted to assess the efficacy of this technique for management of spruce beetle. An effective spruce beetle bait is available but use patterns and costs of alternative practices must be assessed.

- P. Hall, Protection Branch, Victoria

Use of Mountain Pine Beetle Semiochemicals in Prince George Region. In the Prince George Forest Region in 1984, 247 semiochemical baits were deployed against mountain pine beetle in the Prince George West, Ft. St. James, and Vanderhoof Districts. Baits were used either to protect adjacent timber, contain beetles prior to logging, or for monitoring purposes.

Baiting was generally successful and attacked pine were logged or piled and burned. In 1985, semiochemical baiting will be used more extensively in the Prince George Region.

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

Semiochemicals for Mountain Pine Beetle in the Cariboo. The Cariboo Region purchased 6,200 pheromone baits for use during the 1985 beetle flight. Industry has also purchased a large number of baits under Section 88 funding.

Most of the baits will be used to concentrate beetle attack, thus effecting removal of a larger amount of the beetle population through logging. A major

duty of the new regional entomologist will be to determine the effectiveness of these baits as a method for dealing with the mountain pine beetle.

- D. Doidge, Cariboo Forest Region, Williams Lake

Standardization of Procedures and Reporting. A report by the Canadian Forestry Service discussing methods currently in use and reporting formats for mountain pine beetle activities was circulated to the regions in 1984-85. This report illustrated the need for standardization, especially for recording of information collected, eventually in a pest management information system.

A task force of district, region, and branch staff will be formed to review the report and comments, and make recommendations regarding standardization.

- P. Hall, Protection Branch, Victoria

Mountain Pine Beetle Film. Motion picture film footage of some mountain pine beetle-related management practices was obtained during 1984-85. Activities recorded include construction of access roads, beetle probes, and fall-and-burn operations. Further filming of these and other activities is planned for 1985/86. A new film dealing with management of mountain pine beetle will be completed in 1986.

- P. Hall, Protection Branch, Victoria

Forestry Students Probe for Spruce Beetles. On April 2, 1985, twenty-five second-year students of the College of New Caledonia's forest resource technology program conducted a probe for spruce beetle in the Prince George East Forest District. This exercise was preceded by classroom instruction on spruce beetle biology, population dynamics and probing techniques. Field guidance was provided by Forest Service staff from two districts and the regional office.

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

Top-Kill of Spruce by Ips perturbatus. Spruce engraver beetle, Ips perturbatus, top-killed mature spruce in pockets in the Prince George East Forest District. Examination of stands revealed attacks from 1982 to 1984. I. perturbatus normally infests slash, right-of-way debris or Dendroctonus-killed timber.

In these instances, it is surmised that root and butt rots predisposed the stands to the secondary attacking Ips sp. In one area of the Bowron River drainage, it was suspected that I. perturbatus bred in spruce beetle-infested timber before attacking tops of adjacent trees.

- R. Hodgkinson, Prince George Forest Region, Prince George, and G. Magee, Prince George East Forest District, Prince George

Dryocoetes affaber in Spruce. In 1984 during a recent field trip to the Gopherhole Creek area of the Mackenzie Forest District, we observed that Dryocoetes affaber had attacked small-diameter, standing spruce. This was interesting because D. affaber usually only attacks the boles of dying or felled conifers, and seldom is a primary attacker like the western balsam bark beetle, D. confusus. There was some evidence that this stand was suffering from root rot thus perhaps making it more susceptible to attack by D. affaber.

- R. Hodgkinson, Prince George Forest Region, Prince George, and J. Jones, Mackenzie Forest District, Mackenzie

Vancouver Region Sitka Spruce Weevil Survey. The report "Vancouver Region Sitka Spruce Weevil Survey Results (1982-83) with Recommendations for Planting Sitka Spruce" summarizes and interprets the results for the survey of Pissodes strobi conducted throughout the Vancouver Forest Region in 1982 and 1983.

The report delineates weevil hazard zones and provides recommendations for planting Sitka spruce within these zones. Based on the weevil's sensitivity to temperature and humidity regimes on the coast, hazard zones for this insect were closely related to biogeoclimatic (ecological) divisions within the Vancouver Forest Region. Copies of the report are available from the Vancouver Forest Region office.

- D. Heppner, Vancouver Forest Region, Burnaby

Spruce Weevil (Pissodes strobi) Program in the Kalum Forest District. For the past three years an intensive spruce weevil detection and control program has been conducted within the Kitimat River Valley. This valley contains some of the highest quality growing sites within the Kalum Forest District. The entire program has been conducted utilizing the manpower from employment development programs. The following table summarizes the work conducted to date.

Survey and Control of Pissodes strobi

<u>Date</u>	<u>Detection</u> <u>(ha)</u>	<u>(ha)</u>	<u>Control</u> <u>Leaders Clipped</u>
1981-83	2800	437	8885
1983-84	2349	469	3601
1984-85	2056	Scheduled	

An analysis of the data will be completed by June 1985. At least three years data were required in order to evaluate the success of the control program. This year a weather station to determine degree days will be set up in the project area to monitor the biological development of the weevil.

- B. Simpson, Kalum Forest District, Terrace

Control Trials for Root Collar Weevil. Control trials for the root collar weevil, Steremnius carinatus, using two methods of application of pine oil repellent, and screefing (as reported in PMP Vol. 3, No. 1 and 2) were examined in November 1984. Data collected include: seedling height, vigour, time of attack (before or after death), extent of girdling, and planting medium (humus or mineral soil).

Statistical analysis of the results indicated that pine oil and screefing were the most effective in preventing mortality, whereas the squirt method of applying oil resulted in severe phytotoxic effects and did not prevent attack. More detailed results will be available by the end of May, 1985.

Future monitoring of the site will provide information on the recovery of attacked seedlings and the number of years the seedlings are susceptible to attack. Future projects will include the use of prescribed burning as a deterrent.

- K. Kassay and D. Heppner, Vancouver Forest Region, Burnaby

Cone and Seed Insect Control Trials. In 1984, a repeat of trials established in 1983 (PMP Vol. III, No. 2) showed that Metasystox-R® reduced Douglas-fir cone gall midge populations when applied as stem injections or foliar applications.

At Quinsam seed orchard, stem injections using one Mauget Injecticide® capsule per 15 cm of tree circumference reduced the number of galls by one-third in a year of heavy infestation. Foliar sprays of Metasystox-R® at 0.25%, 0.50% and 1.0% reduced populations by 96-100%.

These trials will be repeated in 1985 and a minor use registration for the insecticide will be applied for.

- D. Summers, Silviculture Branch, Victoria

Gypsy Moth Update. Significant finds of gypsy moth were recorded in Courtenay and Chilliwack in the summer of 1984. Plans are under way to eradicate these outbreaks with multiple sprays of Bacillus thuringiensis. The Plant Health Division of Agriculture Canada, the lead agency in this program, is supported by the B.C. Ministry of Agriculture and Food, and the B.C. Ministry of Forests.

Further contingency plans for action and agency responsibilities should gypsy moth become established in the province are being developed.

A pheromone survey will be continued this summer and Ministry staff will place traps out in heavy-use, forest recreation areas.

- P. Hall and R. DeBoo, Protection Branch, Victoria

The Gypsy Moth Threat - Getting Ready. Apart from current project planning for operations at Chilliwack and Courtenay, representatives from five government agencies are now working on a master plan to augment and support Agriculture Canada endeavors to suppress existing populations of gypsy moth and to prevent spread.

This assignment, being conducted under the auspices of the Plant Protection Advisory Committee, includes policy integration, public awareness, and operational procedures for detection and control. Major objectives will be to recommend roles and responsibilities should widespread and serious infestations occur in B.C.

- R. DeBoo, Protection Branch, Victoria

Prince Rupert Pest Management Information System. A pest management information system for bark beetles in the Prince Rupert Region was designed in 1984 for data base software, with a worksheet set up on an IBM personal computer and with copies made for the Wang and for each forest district. Although this system is very elementary and unsophisticated, it provides a first step towards standardized information and quicker compilation of district and regional data. Reports can be generated for any combination of 32 columns on the worksheet. Six standard reports are readily available, including: general report, detection report, impact projection, harvest summary, loss summary, and control summary. The system has been used by Bulkley and Morice District protection staff and it appears satisfactory until a provincial information system is developed.

- A. Gorley and V. Barge, Prince Rupert Forest Region, Smithers

PATHOLOGY

Engineering Studies of Stump Removal for Root Disease Control. A working group of representatives from Silviculture, Engineering, and Protection Branches has been discussing mechanical removal of stumps to control root diseases. General objectives are to develop machinery or procedures to remove stumps efficiently, reduce costs, avoid impact on soils, and effectively prevent disease.

J. Bonfonti, Engineering Branch, investigated the feasibility of physically removing stumps and roots and estimated costs. A brief report on the findings is available.

Recommendations were to test some machinery in field trials in 1985: the Symonds Blade Plough for stumps 60 cm diameter or less and the Vibro Stump

Puller. Detailed planning of field trials will be undertaken when funds become available.

- J. Muir, Protection Branch, G. Cousens, Silviculture Branch, and J. Bonfonti, Engineering Branch, Victoria

Kamloops Mistletoe Control. Silviculture projects in 1984-85 for controlling dwarf mistletoe by post-harvest site treatments included a project by Canada Works Program of 170 hectares, and 1450 ha treated under the Silviculture Rehabilitation Program.

- E.A. Desnoyers, Kamloops Forest Region, Kamloops

Assessing Impact of Laminated Root Rot in Douglas-fir. The Land Use Planning Advisory Team of MacMillan Bloedel Ltd., together with the Canadian Forestry Service, recently completed an Environment 2000 project to assess the impact of laminated root rot in Douglas-fir stands nearing harvestable age.

Because the Ministry of Forests Vancouver Region root disease survey did not provide data on older-age stands of Douglas-fir, the impact of the disease on these older stands was unknown. The objectives of this study were to provide spread and impact data for these older stands in order to aid development of root disease management strategies.

The project used the transect-line sampling system developed by Bloomberg and colleagues to estimate incidence, distribution and area infected with root rot. To assess growth impacts, increment cores were taken from trees growing in and outside root rot centers along each transect.

Stands selected were pure, even-aged Douglas-fir or a mixture of fir and deciduous species, growing on good to medium sites (site index greater than 27 m). Over 50% stocking was preferred, but stands with a deciduous component required a higher level of stocking. All stands were older than 50 years.

The increment core and survey data are now being analysed.

- J. Kumi, Woodlands Services, MacMillan Bloedel Ltd., Nanaimo, and J. Beale, Vancouver Forest Region, Burnaby

Cooperative Stump Removal Trials for Control of Laminated Root Rot. B.C. Ministry of Forests and Canadian Forestry Service Pacific Forest Research Centre have undertaken cooperative trials to test removal of stumps and roots with laminated root rot, caused by Phellinus weirii, to prevent the root disease in succeeding forest crops.

The sites presently under observation include 2 ha at Lake Cowichan which were de-stumped in 1972 and planted in 1973, and 27 ha at Duncan de-stumped in 1979, planted 1983.

At Duncan, four trees out of 1558 planted had died in 1984 from the root rot. These trees had been planted directly over infected root segments left after treatment.

At Lake Cowichan in the treated area, about 1% of the planted trees have died from the disease. Most of these trees were planted over small infected roots, and most died within 3 to 5 years of planting. Only two trees have died since 1978.

In the untreated area, out of 719 trees planted, 4% have died of root rot, with more trees killed recently. Trees planted at 2.5 x 2.5 m spacing now have roots of 3 m length or longer, so that tree-to-tree spread of disease is expected.

These sites will continue to be monitored over the next twenty years by Ministry and CFS staff. Other trials have been established or are planned for laminated root rot and other root diseases.

- G. Reynolds, Canadian Forestry Service, Pacific Forest Research Centre, Victoria, R. Mueller, Duncan Forest District, Duncan, and J. Woods, Mesachie Lake Research Station, Mesachie Lake

Incorporation of Root Disease Data into Ministry forest management plans and analyses of timber yields. Following the recent, region-wide survey of forest root diseases in the Vancouver Forest Region, and the compilation ("black book") of general estimates of pest impacts for the Ministry's planning processes for Timber Supply Areas (Editor's note: see accompanying reports in this and previous issues of PMP), data have now been specifically inserted and considered in the yield analysis for the Quadra TSA.

Unlike previous analyses, where pest losses were accounted for by a single, estimated deduction, the Quadra TSA analysis includes a reduction for root disease in the managed stand yield tables, which should more realistically portray the dynamic effects of disease. These reductions will be used to calculate forest yields for the various forest units and management program options, including the status quo program, silviculture, timber utilization, and integrated forest resources.

Analysis of the protection program option for the TSA will use the unreduced managed stand yield tables to calculate the effects of treatments for root diseases, particularly laminated root rot.

More details of these procedures are outlined in the "Quadra TSA Yield Analysis Information Report," April, 1985, available from this office. A similar process is planned for the forthcoming yield analysis for the Nootka TSA.

- P. Wood, Vancouver Forest Region, Burnaby

Early Harvest of Root Diseased Stands. In the Vancouver Region, a recent directive from the Regional Manager (Vancouver Circular VR85-470) has stipulated that stands younger than the minimum cutting age for Timber Supply Areas may be harvested if a survey can demonstrate that the stand has at least 10% root disease infection by area. In addition, a written plan detailing the post harvest root disease control plan (i.e. stump pulling or planting to a resistant species) must be presented.

A further directive from the Regional Manager outlining the requirements for root disease management in TSAs is being prepared. This will include harvesting priorities, survey and control requirements, precautions for juvenile spacing and commercial thinning, and requirements for maintaining record systems.

- P. Wood, Protection Branch, Victoria

Spruce Cone Rust Control. Between 1982 and 1984, trials of the fungicide ferbam against spruce cone rust were conducted at Skimikin Seed Orchard in cooperation with J. Sutherland and T. Woods, Canadian Forestry Service.

Results showed that single or multiple applications of ferbam during or near the pollination period will control this rust. A full report is in preparation, and a minor use registration for the fungicide will be applied for.

Other candidate fungicides will be tested in 1985.

- D. Summers, Silviculture Branch, Victoria

Root Disease Control as a Cutting Permit Requirement. Control of laminated root rot by stump and root removal has been included as a cutting permit requirement for an area proposed for logging in the Squamish Forest District. Permit clauses and appraisal allowances have been worked out by the District's protection and timber administration personnel. This requirement is also being considered for other areas of the Vancouver Region.

- P. Wood, Vancouver Forest Region, Burnaby

Salmon Arm Root Rot Project. Two public meetings at Celista and Eagle Bay were held to discuss the White Lake root rot problem area. Aesthetics, slash disposal, restocking alternatives, site treatment, landscape management, and harvesting methods were addressed.

The eighty-nine people attending these meetings were also presented five landscape-logging alternatives to consider. Written submissions were invited and are still being received at this time.

- W. Langlois, Salmon Arm Forest District, Salmon Arm

Root Disease Illustrations. Colour plates illustrating laminated root rot and Armillaria root disease have been published. These complete the illustrations for the Inventory Manual Section 9.4 "Major forest diseases of British Columbia." Recipients of this section can obtain the illustrations from the Planning and Inventory Branch.

- S. Ilyntzky, Planning and Inventory Branch, Victoria

Protection Branch Disease Management Activities. Four slide-tape shows on laminated root rot, Armillaria root disease, western hemlock and lodgepole pine dwarf mistletoes are nearing completion. Art work and assembly of master copies are underway and copies should be available soon, possibly by July.

Camera-ready copy was completed for the proceedings of the workshop on management of hemlock dwarf mistletoe, and a 20-page brochure on forest diseases and forest management in B.C. These should be published in 1985 when funds are available. A layout for a root disease display was drafted and reviewed.

Chapters on root diseases and dwarf mistletoes for the Protection Branch - Pest Management, Volume 2, were reorganized and rewritten. They will be distributed soon for comment. Further chapters on stem diseases and heart rot are planned.

- J. Muir, Protection Branch, Victoria

Hemlock Dwarf Mistletoe in the Vancouver Forest Region. A preliminary analysis of hemlock dwarf mistletoe incidence in coastal forest inventory sample plots for Forest Inventory Zones A, B and C indicate that 36 to 51% of the plots were infected. Incidence was based on the occurrence of bole swellings only. Apparently there are significant differences in incidence between some forest type groups, site class and age classes.

Further analyses are planned to investigate relationships and interactions between mistletoe incidence and type group, site class, and age class. We

also hope to derive a 3-class mistletoe rating system (severe, moderate and low), similar to the Hawksworth 6-class system to examine correlations between incidence and volume impacts.

Results from these analyses, showing opportunities for gains in forest yield from mistletoe control, should be applicable to the upcoming yield analyses for the Nootka, Kingcome and Mid-Coast Timber Supply Areas.

- J. Beale, Vancouver Forest Region, Burnaby

VEGETATION MANAGEMENT

Controversial National Film Board Production. A feature presentation on the Nova Scotia controversy concerning the use of 2,4-D and 2,4,5-T has been released by NFB offices at Vancouver, Victoria, and Prince George. Entitled "Herbicide Trials," the ca. 50 minute film has disturbed many foresters in B.C. and across the country. It appears that the Commissioner does not intend to present either an explanation of the approach taken (to potential viewing audiences) or a companion film on the approaches to herbicide use and regulation in forest management as taken by professional managers.

- R. DeBoo, Protection Branch, Victoria

New CCREM Proceedings Available. Proceedings of the seminar on herbicides are now available either from the Canadian Council of Resource and Environment Ministers office at Toronto or from the undersigned. Entitled "Proceedings of Seminar on Herbicides and Forest Renewal" (121 pp.), the report includes several papers of special interest to British Columbians. The report is particularly useful for gaining understanding of the restrictions and difficulties concerning forestry registration, regulation and use as encountered by the CCREM Task Force 1981-1984.

- R. DeBoo, Protection Branch, Victoria

Alder Control Using the Ministry of Forests Lance Injector (Silviculture Trial SX 83401 Q). In late June 1983, alder (*Alnus rubus*) stems ranging in diameter from 6 cm to 32 cm DBH were injected using the Lance Injector. Two herbicides, glyphosate (Roundup) and 2,4-D amine (Forestamine) were tested, both at rates of 50% and 100% product.

An interim assessment was made one year following treatment. Full strength (100%) 2,4-D amine appeared to be slightly more effective than glyphosate, at a rate of 0.7 ml per injection. Considering the difference in price between glyphosate and 2,4-D amine and also the results obtained in this trial, 2,4-D amine would be the desirable choice. However, since more injections per stem are required when 2,4-D amine is used, the increased treatment time and associated labour costs must be considered.

The final assessment is scheduled for June 1985.

- G. Ackerman, Silviculture Branch, Victoria

New Herbicide Injection System. A new herbicide injection system will be evaluated in the summer of 1985. It offers accurate calibrated delivery, and less operator exposure. This system, developed and used in Europe, has several advantages over equipment currently available.

The unit consists of a hatchet with a cupped blade which is used to produce a curved cut (hack). This cut is better suited to holding the chemical than straight cut produced by conventional hatchets.

To deliver the chemical into the cut, the nozzle of the applicator gun is placed into the cut and the worker presses against the stem. The applicator gun can easily be adjusted to deliver any quantity of solution between 0.5 ml to 3.0 ml per injection. Commonly, 1 ml per injection is recommended by most chemical manufacturers.

The applicator gun is connected to a storage bottle by a delivery tube. Two models of storage bottles are available, a 1-litre container which is fastened to the waist, and a 5-litre container which is worn on the worker's back. The 5-litre backpack unit is easy to carry and should eliminate the need for refilling during the working day. With conventional hack and squirt operations, there is a threat of operator exposure and possible spillage during the process of refilling.

This unit is being marketed in B.C. by Windsor Metal Products, 2965 Lake City Way, Burnaby, B.C., V5A 2Z9, Phone 421-5445. The hatchet, applicator and 1-litre belt style unit is selling for \$199.00. The similar unit with the 5-litre backpack unit is available for \$299.00. For further information, contact Windsor Metal Products, attention Mr. Clint Shepard, or G. Ackerman (387-1191).

- G. Ackerman, Silviculture Branch, Victoria

Garlon 4E Herbicide Trial at McGuire Creek. An aerial application of the herbicide Garlon 4E (Triclopyr) was completed on September 9, 1983, on a site near McGuire Creek, east of Vedder Crossing. Three application rates, 0.48, 0.75, and 0.96 kg/ha active ingredient, were applied to a variety of vegetation such as red alder, Canada thistle, black cottonwood, and thimbleberry. A Bell 47 helicopter, employing a total of three nozzles (two teejet and one veejet) arranged vertically, was used to apply the herbicide/water mixture at a rate of 100 litres per ha.

Results were disappointing, apparently due to the low concentrations used. Only red alder showed significant herbicide damage, mainly in the form of

mortality. Thimbleberry and black cottonwood showed signs of stem dieback but the next year's growth appeared healthy. Minor herbicide damage also appeared on coastal American red alder and sitka willow. Because of the poor results, this trial will be considered complete.

Another Garlon 4E trial was established near McGuire Creek (Deer Creek) in 1984 employing higher concentrations (1.5 and 3.0 kg/ha a.i.), and the results will be reported in a future edition of PMP.

- B. D'Anjou, Vancouver Forest Region, Burnaby

Clump Treatment of Bigleaf Maple with Glyphosate (Roundup). In August 1983, a coppice stand of bigleaf maple near Pender Harbour was sprayed with three concentrations (0.75, 1.0, 1.25% by volume) of the herbicide glyphosate (Roundup).

Results were difficult to interpret since quality of herbicide application was poor - up to 42% of sampled maple clumps were unsprayed within one plot. In one plot, 88% of the stumps were killed by herbicide.

The trial emphasized the need to spray all stems within the cluster for complete control since unsprayed stems continued to grow freely. A method of marking treated stumps, such as flagging, and more training of applicators were suggested to reduce percentage of unsprayed stumps. A rapid invasion of several other brush species such as red alder, thimbleberry, and salmonberry also showed the importance of considering not only the brush species which appear most dominant at time of spraying, but all brush species within an area.

Because of quality of herbicide application and invasion of other brush species, the trial will be considered complete.

- B. D'Anjou, Vancouver Forest Region, Burnaby

Mechanical Cutting of Red Alder. During 1983, a three year old red alder stand overtopping conifer seedlings was manually treated with circular brush saws in six treatment periods between June 7 and December 29. The objectives were to assess the impact of timing on the success of alder control and to measure the growth response of conifers after alder removal.

Preliminary results indicated alder mortality was highest from cutting in the late summer-early fall treatment periods (Aug. 3-Sept. 1) with maximum mortality of 66% from cutting during the August 3 period. Poorest results (lowest mortality) occurred after the late spring (June 7) cutting period.

Conifer response was immediate, with both Douglas-fir and grand fir seedlings doubling their diameter increment in treated plots relative to control plots during 1984 growing season. So far, height growth has not improved through alder removal.

Further monitoring of red alder and conifers will be undertaken during 1985 and 1986 to determine the long term benefits of mechanical control of red alder.

- B. D'Anjou, Vancouver Forest Region, Burnaby

Standards for Forest Vegetation Management Research Trials. As a result of extensive discussion and preparation over the past two years, "experimental design protocols for forest vegetation management research" have been published by Research Branch. The "Level A" and "Level B" protocols in two separate "Research Reports," were jointly authored by Les Herring (Prince George Region) and John Pollack (Prince Rupert Region). Copies are available from Research Branch in Victoria (contact Tim Mock).

The need for standards in forest vegetation management trials and research was evident given the large demand for such work throughout the province and the need to ensure quality and cost-effectiveness of the efforts. Observance of the experimental design protocols will ensure that future trials are statistically sound and as uniform as possible to permit direct comparisons among sites with similar vegetation.

Ministry researchers and contract researchers (e.g. under Section 88 funding) should consult these protocols when planning and implementing experimental projects (E.P.'s) in forest vegetation management research. They should be regarded as guidelines which may need adjustment based on site-specific conditions and experimental objectives. Procedures for vegetation management Sx trials are in Chapter 12 of the Silviculture Manual.

The upcoming Ministry policy, Forest and Range Pest Management - Pesticide Regulation and Use, will indicate that where research projects involving unregistered pesticides are warranted, these will conform to E.P. trial guidelines as prescribed by the Director, Research Branch. For trials involving unregistered herbicides, either the Level A or Level B protocol (depending on the nature of the experiment) is expected to be observed in this regard.

A final important point is that the principles underlying these research protocols have been officially endorsed by the Expert Committee on Weeds (Western Silviculture Group). This means that the findings of research which is planned and conducted in accordance with these guidelines are eligible for reporting in the annual E.C.W. Research Report, the contents of which are considered by Agriculture Canada for pesticide registration and label extension.

- H. Benskin, Research Branch, Victoria

Vegetation Management Research Program. An extensive program of ecological research on vegetation competition has been initiated by the Ministry of

Forests Research Branch. Projects include description and classification of complexes of competing vegetation in the early, seral stages in development of forest ecosystems; studies of change in the floristic composition and structure of these complexes with time; competitive effects of different vegetation complexes on crop tree growth; and capabilities of the Ecosystem Classification Program for predicting the brush hazard of different forest ecosystems. The following research projects are ongoing:

- Competing vegetation complexes in approximately 80 variously aged and site-prepared clearcuts in the Sub-Boreal Spruce (SBS) Biogeoclimatic Zone near Prince George were classified in 1984, and data were analyzed to determine floristic composition, patterns of vegetation development and growth of crop trees in different early seral ecosystems. (E. Hamilton, Victoria.)
- Preliminary surveys of the brush communities in the Interior Cedar Hemlock (ICHh) and Engelmann Spruce Subalpine Fir (ESSFn) subzones in the Cariboo Forest Region were done last summer to determine the floristic composition of early seral ecosystems on burned and unburned mesic and wetter sites. Further work to monitor the effects of different vegetation complexes on site microclimate and crop tree growth in the ESSFn is planned. (O. Steen, Williams Lake.)
- Development of a classification of the early seral ecosystems in the ICH and ESSF zones is ongoing in the Nelson Forest Region. Further work is underway to assess the capabilities of the Ecosystem Classification Program for predicting floristic composition including key brush species. (M. Ketcheson, A. Warner, S. Thompson, Vegetation Systems Research Ltd., Nelson, and T. Braumandl, Nelson.)
- Development of indices of the competitive effect of brush communities is underway in the Prince George Region. The proximity and height of the competing vegetation will be used as a basis for evaluating the competitive effect on crop trees. Guidelines for research in this area have been developed and a program to test these protocols is underway. (C. Delong, Prince George.)
- Monitoring of the development of competing vegetation and crop trees response in the prescribed fire research sites in the ICHg, ESSFk, SBSs and Coastal Western Hemlock (CWHg and CWHf) subzones is ongoing in the Prince Rupert Region. (A. Macadam, R. Trowbridge, J. Pollack, J. Pojar, A. Banner, Smithers.)
- Development of competing vegetation and crop tree response is being monitored in several site preparation trials in the SBSj subzone in the Prince George Forest Region. (C. Delong, Research, Prince George.)
- Development of competing vegetation and its impact on the growth of planted western hemlock is being monitored in burned and unburned sites in the CWHb on Vancouver Island. (F. Nuszdorfer, Burnaby.)

- A Land Management Report outlining current knowledge of the autecology of 31 key species of competing vegetation has been prepared and will be available this summer. The document was based on a review of the literature and interviews with knowledgeable individuals. (S. Hauessler and D. Coates, Skeena Forestry Consultants, Smithers.)

- E. Hamilton, Research Branch, Victoria, and Regional Staff

Vegetation Management Research in a Boreal "Backlog" Area. A large-scale research trial of mechanical site preparation treatments and vegetation control methods is underway on a not satisfactorily restocked, backlog site in the Boreal white and black spruce biogeoclimatic zone.

The project, a joint Research Branch and Prince George Forest Region Silviculture research initiative, is located in the Dawson Creek Forest District. Initial site preparation treatments were done in fall, 1984 and winter, 1985.

Planting will commence this spring, with the first herbicide application of glyphosate scheduled for late summer of 1985. Further information contact Les Herring (565-6100) or Rick Fahlman (963-9651).

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

RANGE PEST MANAGEMENT

Update on the Knapweed Chemical Containment and Biological Control Program. Since the last issue of Pest Management Progress, the Ministry of Forests submitted an Issue Paper to Treasury Board which increased funding by approximately \$400,000 to the budget levels as shown below.

1985-86 Funding for Knapweed Program

<u>Region</u>	<u>\$ Allotted</u>
Kamloops	208,000
Cariboo	65,000
Nelson	78,000
Victoria	200,000
Total	551,000

Knapweed infestations in the Vancouver Forest Region are "managed" by the Kamloops Forest Region. Prince George and Prince Rupert Forest Regions considered that they could obtain funding from existing budgets for a knapweed

program. In the 1985/86 budget update it is likely that the knapweed program in Vancouver, Prince George and Prince Rupert will have to receive additional funds through special issue papers.

Funds allocated to the forest regions are principally for knapweed spray containment. Funding for Victoria is principally for a biological control program, described previously.

SHORT-TERM PRIORITIES:

Short-term priorities for the program include:

- Distribution of available agents which have not yet spread to target areas but which have large impacts and can readily survive. These agents include a moth which affects the seed head of spotted knapweed; and a fly which forms seed head galls in both diffuse and spotted knapweed.
- Evaluation of biological control agents which are now widely spread in infested areas, including the above two insects, and another fly which forms seed head galls in both diffuse and spotted knapweed, is widely distributed in British Columbia and has also spread into the States of Washington and Oregon.
- Field propagation of biological control agents which have been successfully introduced to B.C. but which have not been successfully introduced on an operational basis, including a beetle which may have a limited impact as a defoliator but has a major impact as a root feeder.
- Introduction and successful establishment of other biological control agents which have been screened and approved for release in Canada.
- Evaluation of a nematode which forms stem and leaf galls on Russian knapweed and may be effective on diffuse knapweed.
- Identification, search, propagation and screening of additional biological control agents from Europe. There are only limited data and information about the life history or ecological amplitude of these agents because knapweed is not a major problem in Europe or Asia where these insects have been collected.

These priorities are all considered high priority and have or will receive funding in the 1985/86 knapweed program. Some funding will also be allocated to complete a study of the interaction between chemical containment and biological control of knapweed. Additionally, Agriculture Canada is evaluating the feasibility of increasing the number of Agapeta zoegana under controlled conditions in a greenhouse environment. This study will attempt to raise three generations of the agent per year where only one is now obtained under normal climatic conditions.

In addition to the above studies, some support is being directed to the following projects:

- Evaluation of the impact of knapweed upon forage production over a continuum of different knapweed infestation densities.
- Range and rate of spread of knapweed.
- Interactions among biological control agents in different environmental situations. To date it was assumed that biological control agents supplement or complement each other. Some limited research is in progress in this area.
- Remote sensing and large-scale photography to detect knapweed infestations. Some limited research is in progress in this area.

These studies should facilitate other research efforts and make operational programs more efficient. Although these studies are not essential for prioritizing and evaluating the top priority, short-term projects, they are important for the biological control program. Given the wide range of knapweed habitat in B.C., biological control agents from similar habitat in Europe or Asia must be introduced if knapweed is to be reduced to the inconsequential level that it occurs in Europe and Asia.

Project goals were developed for each of the short-term proposals. One goal for the first year is to estimate when various biological control agents which are now successfully established in B.C. may reasonably be expected to be distributed throughout B.C.

Another major short-term goal is to establish a Knapweed Control and Containment (KCC) Program Protocol Agreement between various Provincial Ministries, Federal Ministries or Federal research agencies, private sector and other shareholders in the Crown and private, forested and non-forested rangelands in British Columbia. The Knapweed Action Committee and its functions will be incorporated in the KCC. The KCC will continue the interaction with the prairie Provinces in Canada and research with cooperating States in the U.S.A.

Some objectives of the KCC will include:

- To secure and administer program funding.
- To implement a management committee and monitor its functioning.
- To keep Deputy Ministers informed of progress.
- To provide a mechanism for problem resolution.

It is fairly clear that many of the biological agents will have to be reared in controlled environments to reproduce the biological control agents for distribution, and to establish the agents in colonies at an operational level. Without these investments to increase the rate of implementation, the natural reproduction of some agents will take several decades over which time knapweed will continue to spread and increase in density.

Progress to date in biological control has been impressive but inadequate. Future progress will be slower and more expensive but should have high returns for selected courses of actions. All funding agencies and participants are thanked for past contributions and their continued enthusiasm and support is needed to make biological control of knapweed the reality which it is in Europe.

The Knapweed Problem Analysis which is now being internally reviewed has assisted in identifying opportunities and alternative courses of action. There are several projects being initiated in addition to those discussed above.

For further information on the Knapweed Program please call: W.N. McLachlan, Director, Range Management Branch (387-3213), Earl Jenson (387-6656), Brian Wikeem, Kamloops (376-1331), or Roy Cranston, Ministry of Agriculture & Food, Kamloops (828-4552).

- E. Jenson, Range Management Branch, Victoria

PESTICIDES

FLULC Position Paper in Limbo. After 2 years and 10 drafts, the Subcommittee chaired by Dr. Terry Simmons presented a consensus statement on pesticide use in forest management to the Forest Land Use Liaison Committee in January 1985. All but one member accepted the paper as a useful and workable reference document. At time of writing (April) the fate of the paper remains unclear.

- R. DeBoo, Protection Branch, Victoria

Tussock Moth Virus Purchase. Minister Waterland signed an agreement with the U.S. Forest Service (Portland) in March, 1985 to acquire a substantial stock of virus insecticide to combat future outbreaks of the Douglas-fir tussock moth in the southern interior of B.C.

Coupled with improved surveying capability, acquisition of this material will afford excellent opportunities to both suppress outbreaks and prevent population spread. This naturally-occurring disease agent will likely be the insecticide of choice for future aerial control operations.

- H. Doerksen, Protection Branch, Victoria

On Environmental Politics, Cancer and Chemicals. An interesting new book "The Apocalypitics" by Edith Efron (Simon and Schuster, 1984) examines facts and fallacies surrounding pesticides and many other chemicals used in North American societies. The book offers an unusual insight into regulation of chemicals, and the reasons for decisions regarding suspensions or withdrawals. My copy is available, on a short term loan basis, to readers interested in this provocative topic.

- R. DeBoo, Protection Branch, Victoria

Slide Show for Forest Pesticide Training. The first two shows of a three-part series are available and can be borrowed from Information Services Branch, 1450 Government Street, Victoria. Contact: Jeremy Brown at 387-5788.

These shows, designed both for training and public information, cover:

- I. Pesticide Regulation and Control - including federal registration, the provincial permit system, storage, transport and MOF policy on pesticide use.
- II. Herbicides - including registered herbicides and their use.

Part III on insecticides should be available soon.

- S. Taylor, Protection Branch, Victoria

Applications for Forest Pesticide Use Permits. Applications for forest pesticide use permits for the 1985 season have now been submitted to the Pesticide Control Branch, Ministry of Environment, and are under review. Approximately 417 applications were submitted this spring, most of them for a three-year period. The approximate area to be treated by herbicides is 26 808 ha and for insecticides, 1 082 ha.

- J. Henigman, Protection Branch, Victoria

Policy and Procedures for Pesticide Use in Forest and Range Pest Management. The draft policy and procedures will soon be completed and implemented by the B.C. Ministry of Forests. The policy will require a high standard of conduct when working with pesticides, and ensure that all Ministry staff using pesticides are adequately trained. Procedures accompanying the policy will outline staff responsibilities and acceptable working protocols.

- J. Henigman, Protection Branch, Victoria

Forest Pesticide Applicator Courses. Courses have been underway since January of this year teaching forestry staff how to use pesticides effectively and

safely. The four day course prepares the students to write the forestry applicator's examination for certification by the Pesticide Control Branch, Ministry of Environment. From January to June, 1985, ten forestry and two forest nursery applicator courses are scheduled for about 350 people. Course locations include: Castlegar, Nanaimo, Kamloops, Prince George, Smithers, Vancouver, and Williams Lake.

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

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. Henigman (John), Pesticide Specialist, Victoria, 387-5965
J.A. (John) Muir, Forest Pathologist, 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)

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 Water 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, 398-4442
R.E. (Bob) Merta, Regional Pest Management Assistant, Williams Lake, 398-4444
R.M. (Ralph) Kossin, District Pest Management Coordinator, Quesnel, 992-2147

J.R. (John) Bradley, District Pest Management Coordinator, Williams Lake, 398-4329
D.R. (Derek) Poole, District Pest Management Coordinator, Horsefly, 620-3327
R. (Robin) Fennell, 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. (Ron) Edward, Pest Management Coordinator, Kamloops, 374-7741
E. (Eric) Haupt, Pest Management Officer, Vernon, 542-0264
W. (Wayne) Langlois, Pest Management Officer, Salmon Arm, 832-7153
B. (Bob) Read, Protection Resource Officer, Clearwater, 674-2265
J. (Jim) Mottishaw, Protection Technician, Penticton, 492-8271
T. (Terry) Watson, Protection Technician, Penticton, 492-8721
T. (Tom) Lacey, Protection Resource Officer, Merritt, 378-6171

Nelson Forest Region

E. (Ernie) Morris, Pest Management Coordinator, Nelson, 354-4181
D. (David) Gray, Regional Forest Entomologist, Nelson, 354-4181
S. (Steve) Byford, Pest Management Officer, Cranbrook, 426-3391
E. (Emile) Begin, Pest Management Officer, Invermere, 342-9257
D. (Dunc) Cummings, R.O. Protection, Golden, 344-5991
A. (Archie) McConnachie, R.O. Protection, Revelstoke, 837-6111
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. (Jim) 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
R.P. (Bob) Rowsell, Bark Beetle Field Specialist, Smithers, 847-4511

W.F. (Bill) Davidson, Protection Resource Officer, Burns Lake, 692-7515
(Vacant), 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.M. (Paul) Wood, Pest Management Coordinator, Burnaby, 299-9151
J.D. (Jeff) Beale, Forest Pathology Specialist, Burnaby, 299-9151
D.G. (Don) Heppner, Pest Management Assistant, Burnaby, 299-9151
K. (Katalin) Kassay, Protection Resource Coordinator, Burnaby, 299-9151
D. (Dave) Hames, Protection Resource Officer, Chilliwack, 794-3361
B. (Barry) Miller, Protection Resource Officer, Powell River, 485-9831
R. (Ron) Diprose, Protection Resource Assistant, Powell River, 485-9831
D. (Dan) Powell, Protection Resource Officer, Port Alberni, 724-5786
S. (Steven) Schmidt, Protection Resource Officer, Campbell River, 286-3282
W. (Bill) Hardy, Resource Assistant Protection, Campbell River, 286-3282
S. (Stan) Gripich, Protection Resource Officer, Port McNeill, 956-4416
D. (Denis) Tippie, Protection Resource Officer, Mid-Coast, 982-2621
G. (Greg) Hemphill, Protection Resource Officer, Sechelt, 885-5174

MEETINGS

IVMA-PPMA Joint Annual Meetings. The Integrated Vegetation Management Association of B.C. and the Professional Pest Management Association of B.C. held joint meetings at Richmond 3-4 April 1985.

Highlights included presentations on "Basic Concepts in Forest Vegetation Management Research" by Henry Benskin of Research Branch, "Gypsy Moth Operations in B.C." by Ralph Houghton of Agriculture Canada, "Pesticides and the Regulation of their Safety" by K. Gray of the Workers' Compensation Board, and "Wood Supply Analysis and the Allocation of Protection Resources" by Bart vanderKamp of UBC.

Special recognition for their outstanding contributions to forest pest management was granted by the PPMA to retired entomologists Dave Dyer of Victoria and Hec Richmond of Nanaimo. President Adrian Miller (IVMA) received the PPMA Award of Excellence for his innovations and leadership in pest management in the province.

- R. DeBoo, Protection Branch, Victoria

Forest Vegetation Management Committee. More than two dozen Ministry of Forests researchers met in the fall of 1984 to form a committee dedicated to the improvement of forest vegetation-management research in the province. The terms of reference for the Committee include four major objectives:

- Promotion of communication among Ministry and allied agency and company researchers in the field of forest vegetation management.
- Dissemination of research information and publication of results.
- Coordination of vegetation management research.
- Contact and communication with the Expert Committee on Weeds (E.C.W.) and other national groups.

Work by members of the Committee includes publication of the Level A and B Protocols for Forest Vegetation Management Research as Ministry Research Reports, and by mid-1985, publication of a guide to the autecology of major B.C. forest weed species. Eleven herbicide abstracts were submitted to E.C.W. in 1984, and reviews of the research methodology for several vegetation management topic areas are underway.

A one day technical session is planned in conjunction with the Committee meeting in the fall of 1985. Individuals who wish to be included on the mailing list should contact J. Pollack (847-7436 or -7500).

- J. Pollack, Prince Rupert Forest Region, Smithers

Expert Committee on Weeds - Western Section. J. Pollack and J. Boateng attended the December 1984 annual meeting of this national scientific group in Winnipeg, Manitoba. Our research efforts were well represented with eleven silvicultural abstracts from Forest Service herbicide trials, and a half day discussion of the Level A and B experimental protocols.

A report on the session, which includes twenty-five silviculture abstracts, research recommendations for 1985, company views on useful trials with herbicides, new product information, and new research equipment for research applications, can be obtained from J. Pollack.

- J. Pollack, Prince Rupert Forest Region, Smithers

Western Forest Insect Work Conference. This work conference will be held in Victoria in the first week of March, 1986. Those attending the conference will include many of the workers in forest insect research and management in western Canada and United States. This gathering provides an ideal forum for discussing most recent research results and operations, and, as such, should be considered as a valuable tool for rapid technology transfer. The Victoria location of this conference should enable many regional and district staff to attend. More details are available from P. Hall (387-5965).

- P. Hall, Protection Branch, Victoria

Workshop on Bark Beetles and Semiochemicals. A workshop was held in Vernon, May 1-2, 1985, to review and discuss beetle management and, in particular, the use and application of semiochemicals. Resource personnel at the workshop included Dr. J. Borden, Simon Fraser University, P. Hall, Protection Branch, and a representative of PheroTech Inc. In attendance were Forest Service personnel from Kamloops Region and Districts, and industry staff.

The workshop was held to implement these new tactics for pest management.

- P. Hall, Protection Branch, Victoria

Cariboo Protection. Cariboo Region held a spring protection meeting on April 10-11, attended by the Resource Officers Protection and Operational Supervisors from the Districts. Dr. John Borden, Simon Fraser University, discussed semiochemicals. The talk provided an opportunity for field personnel to clarify any concerns with use of these chemicals.

- D. Doidge, Cariboo Forest Region, Williams Lake

Management of Mountain Pine Beetle in Northwestern British Columbia. A three-day symposium on the management of mountain pine beetle was held at Smithers, April 16-18, 1985. Approximately 225 registrants and guest speakers attended from northwestern United States, Alberta and British Columbia. The guest speakers, leading experts in MPB management in North America, presented various new principles and information which are highlighted as follows:

(1) Biology

In view of previous experience, cold weather temperatures will not bring the beetle epidemics under control. Natural predators and parasites are most effective in an endemic stage. Woodpecker predation only accounts for 4% of beetle mortality. There are no viral agents suitable for control although the Canadian Forestry Service has commenced a research program on this topic.

Pure stands located in the northern range of the beetle experience a lower rate of beetle population expansion than stands in the southern range.

(2) Detection

Colour infrared photography has some promise in identifying green attack trees.

Natural colour photography has proven to be very efficient and cost effective for locating infestation centres within the Prince Rupert Forest Region.

Detection, the most difficult phase of MPB management, is the foundation for effective control.

(3) Management Options

A combination of single tree treatment and harvesting is a reliable management option.

Falling and burning single, infested trees has proven effective, as well as use of pheromones to bait single trees and large areas scheduled for logging within a year of baiting.

In the northern USA region, thinning was proven to be an effective method in reducing attack to lodgepole pine.

Road access is critical, because prompt removal of susceptible host stands is essential for long-term management of the beetle.

Other options such as use of the insecticide Sevin are still being studied. Broadcast burning is feasible but expensive.

(4) Economics of Beetle Management

The loss of lodgepole pine to beetles within the northwest will devastate our supply of mature pine, resulting in a premature reduction of annual allowable cuts. This reduction will cause mill closures, loss of jobs and severely affect the economy of the communities involved.

Therefore, we cannot afford to let the beetles run their course. Detection and control plans must be developed and implemented. All sectors of the forest industry must communicate and cooperate to minimize losses and preserve the timber supply on which industry depends.

The symposium was considered a very successful summary and application of scientific knowledge to needs for pest management, and an exchange of experience, ideas and techniques by field personnel involved in current MPB control projects.

A proceedings of the symposium is being prepared by P. Hall, Protection Branch.

- P. Pashnik, Prince Rupert Forest Region, Smithers

WIFDWC, 1985. The annual meeting of the Western International Forest Disease Work Conference is scheduled Sept. 24-27, 1985 at Olympia, Washington.

Pre and post-conference tours on root disease management, nurseries and Mt. Saint Helens are planned. Sessions include transferring research results into operational procedures, disease modelling and reports of western disease control activities. For information, contact J. Muir (387-5965).

- J. Muir, Protection Branch, Victoria

Prince Rupert Pest Review Committee Meeting. The spring meeting of the Prince Rupert Pest Review committee was held April 30, 1985, at the regional office, Smithers. The participants included representatives from the B.C. Forest Service (region and districts), industry, Parks, Canada Dept. of Fisheries and Oceans, B.C. Ministry of Environment, and Canadian Forestry Service.

The agenda included the following items:

- District steering committee (composed of industry and Forest Service) report of control objectives, progress and achievements for 1984-85 for each forest district.
- Update on the regional bark beetle control strategy task force.
- A video cassette show on the "Tree Monkey" by the CFS.
- Bark beetle special funding report for 1985-86.
- Report on the use of colour photography in 1984 detection program.
- Colour photography in 1985 and tendering of contracts.
- Report on mountain pine beetle symposium at Smithers on April 16-18, 1985.
- Report on overwinter bark beetle mortality in the Prince Rupert Forest Region.

These meetings have been invaluable in the past for information sharing and recommendations to improve pest management practices in this forest region.

-V. Barge, Prince Rupert Forest Region, Smithers

Forest Pest Survey Planning Committee. Canadian Forestry Service Forest Insect and Disease Survey and Protection Branch Pest Management representatives met April 26, 1985. The objective of this committee is to coordinate and facilitate pest surveys by both organizations, based on the Memorandum of Understanding "Roles and responsibilities concerning forest insect and disease surveys in British Columbia," signed in August 1984.

Terms of reference for the committee drafted by G.A. Van Sickle and R.F. DeBoo were discussed and adopted. Officers appointed were DeBoo, chair, and Muir, secretary. Van Sickle reported that ranger work plans were drafted, and would be discussed in detail at the spring meeting in each region. DeBoo presented a summary of regional needs and support for pest surveys.

Items for future discussion and resolution included input of regional survey needs for the CFD-FIDS work schedules, joint survey projects, standardization of bark beetle surveys, and methods of insect and disease surveys in plantations and young trees.

- J. Muir, Protection Branch, Victoria

Coastal Silviculture Committee. The 1985 summer workshop meeting, July 16-18, at Powell River will include field inspections of soil compaction problems, root rot treatments, deer browsing problems and solutions, vole damage, manual brushing and girdling, stem diseases as possible biological control of alder, white pine pruning and use of exotic species.

For further information, contact the secretary, M. Wyeth, Silviculture Branch (387-1191).

- J. Muir, Protection Branch, Victoria

TABULATIONS AND GRAPHICS

Nelson Regional Summary Special Bark Beetle Funding 1984-85

<u>District</u>	<u>No. Projects</u>	<u>Surveys (ha)</u>		<u>Access (km)</u>		<u>Pheromones</u>		<u>Trap Trees</u>	<u>Harvest¹ (m³)</u>	<u>Expenditures</u>
		<u>Aerial</u>	<u>Ground</u>	<u>Road</u>	<u>Bridge</u>	<u>Used (ha)</u>	<u>Out and Burn</u>			
Cranbrook	11	292,846	2,125	24	2	650	760	35	130,840	234,420
Invermere	8	4,112	1,332	13.6	1	311	1,016	824	71,675	201,066
Golden	5	-	1,558	-	-	-	-	-	-	66,021
Arrow	1	-	475	-	-	-	-	-	-	5,120
Boundary	5	7,000	-	2.25	-	-	110	-	28,000	38,722
Kootenay L.	3	50,000	3,390	5.4	1	15	-	-	38,600	211,121
Region	1	-	-	-	-	-	-	-	-	3,219
Total	34	353,958	8,880	45.25	4	976	1,886	859	269,115	760,325

1. Estimated volume to be harvested prior to 1985 bark beetle flight, and in pheromone containment areas.

- E. Morris, Nelson Forest Region, Nelson

Prince Rupert Region
Bark Beetle Detection Activities, 1984-85

		<u>District</u>					<u>Totals</u>
		<u>Lakes</u>	<u>Morice</u>	<u>Bulkley</u>	<u>Kispiox</u>	<u>Kalum</u>	
Aerial - area (ha)		871 000	113 200	61 750	3 100	13 128	1 062 878
cost (\$)		12,004	22,336	7,000	8,825	3,282	53,447
Ground - area (ha)		1 485	6 740	12 290	318	334	21 167
cost (\$)		84,000	44,239	58,000	9,540	8,261	204,040
Colour - area (ha)		50 812	145 375	141 062	0	0	337 249
Photos cost (\$)		7,736	22,178	21,663	0	0	51,577
Sec. 88 area (ha)		6 000		1 618		1 300	8 918
cost (\$)		30,000	63,317	40,460		32,500	166,277
Totals area (ha)		929 997	265 315	216 720	3 418	14 762	1 430 212
cost (\$)		133,740	152,070	127,123	18,365	44,043	475,341

- V. Barge, Prince Rupert Forest Region, Smithers

Summary of Bark Beetle Infestations, February, 1985
Prince Rupert Region

<u>Infestations</u>	<u>Lakes</u>	<u>Morice</u>	<u>Bulkley</u>	<u>Kispiox</u>	<u>Kalum</u>	<u>Totals</u>
Mountain pine beetle:						
Area (ha)	593	10 000	6 400	2 850	14 091	33 934
Volume (m ³)	162 900	3 000 000	269,900	783 500	3 030 000	7 245 400
Volume at risk (m ³)	954 000	15 053 000	13 600 000	763 600		30 370 600
Spruce beetle:						
Area (ha)	1 132	3 000	2 500	850	43 385	50 867
Volume (m ³)	333 350	900 000	750 000	254 000	13 016 000	15 253 350
Volume at risk (m ³)	1 527 250	29 069 340	13 600 000	14 500 000	8 800 000	67 496 590
Totals:						
Area (ha)	1 725	13 000	8 900	3 700	57 476	84 801
Volume (m ³)	496 250	3 900 000	1 019 000	1 037 500	16 046 000	22 498 750
Volume at risk (m ³)	2 481 250	44 122 340	27 200 000	15 263 600	8 800 000	97 967 190

- V. Barge, Prince Rupert Forest Region, Smithers

Bark Beetle Control using Pheromones and Logging
Prince Rupert Region

	PHEROMONES				LOGGING		Average Block Size (ha)
	B.C. Forest Service		Industry (Section 88)		Area (ha)	Volume (m ³)	
	Baits	Sites	Baits	Sites			
Lakes ¹	350	25	1350	215	3 000	937 000	31
Morice	2000	300	5100	265	3 962	1 230 300	56
Bulkley	1500	300	250	60	1 400	420 500	100
Kispiox	364	91	0	0	1 330	405 000	
Kalum	<u>300</u>	<u>3</u>	<u>0</u>	<u>0</u>	<u>746</u>	<u>223 800</u>	<u>40</u>
Total	4515	719	6700	540	10 438	3 216 300	57

1. All harvesting will be in spruce blowdown and mountain pine beetle control areas for 1986-88.

- V. Barge, Prince Rupert Forest Region, Smithers

Bark Beetle Control using Single-Tree Treatments,
Prince Rupert Region

		<u>FALL AND BURN</u>				<u>BROOD REMOVAL</u>					
		<u>B.C. Forest Service</u>		<u>Industry (Sec. 88)</u>		<u>Canada Works Program</u>	350 m	<u>Industry (Sec. 88)</u>		<u>Total</u>	
		<u>No.</u>	<u>Cost (\$)</u>	<u>No.</u>	<u>Cost (\$)</u>	<u>No.</u>	<u>No.</u>	<u>No.</u>	<u>Cost (\$)</u>	<u>No.</u>	<u>Cost (\$)</u>
Lakes	1 841	53 000	1369	39 701	0	500				3 710	92 701
Morice	12 030	312 780	2738	95 830	0	2 524	454	9 988	17 746	418 598	
Bulkley	8 198	196 500	717	25 095	2628	12 000	661	14 452	24 204	236 137	
Kispiox	673	12 329	88	2 659	1649	20	0	0	2 410	14 988	
Kalum	<u>650</u>	<u>16 250</u>	<u>19</u>	<u>665</u>	<u>0</u>	<u>55</u>	<u>0</u>	<u>0</u>	<u>724</u>	<u>16 915</u>	
Total	23 392	590 859	4931	163 950	4277	15 079	1115	24 530	48 794	779 339	

- V. Barge, Prince Rupert Forest Region, Smithers

Success of the Mountain Pine Beetle Flight
in the Prince George Forest Region in 1984

District Location	Mean ¹ Egg Gallery Length per Tree (cm) and Standard Deviation	Number of Parent Adults Collected ³
<u>Prince George West</u> Blackwater	11.3 (<u>±</u> 4.9) ²	26
<u>Ft. St. James</u> Chuius Mt.	20.0 (<u>±</u> 9.6)	36
Kuskwa Area	37.2 (<u>±</u> 8.5)	25
Takla Post	--	36
<u>Mackenzie</u> Teare Creek/Chunamon	6.4 (<u>±</u> 2.7)	15
Gopherhole Creek	6.1 (<u>±</u> 2.6)	--
<u>Vanderhoof</u> Ootsa area (2 locations)	7.3 (<u>±</u> 3.4) 7.3 (<u>±</u> 5.1)	7 21
Total =		159

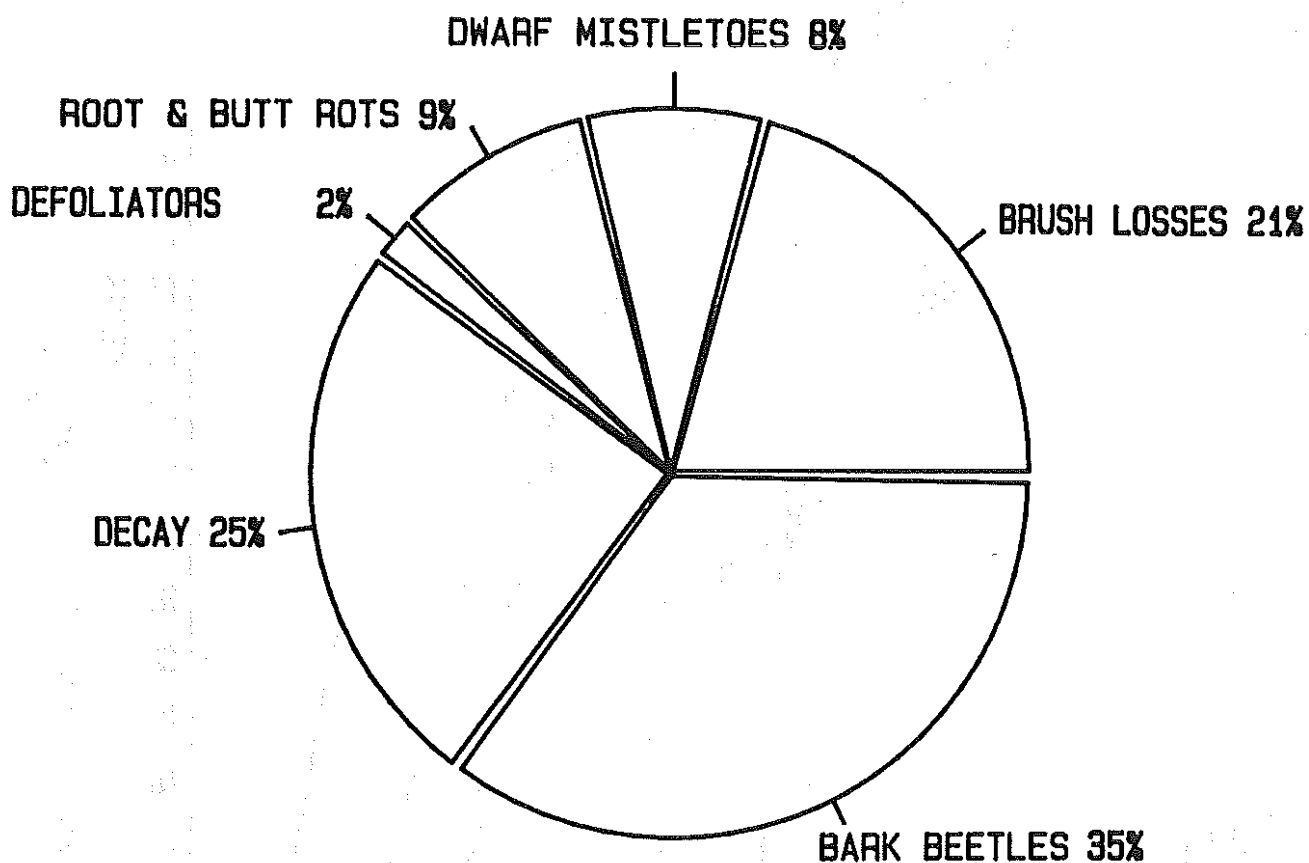
Notes:

1. All mean gallery lengths based on 10-15 galleries per tree; approx. 4 trees per location.
2. Standard deviation.
3. All 159 parent adults and 12 larvae collected were dead.

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

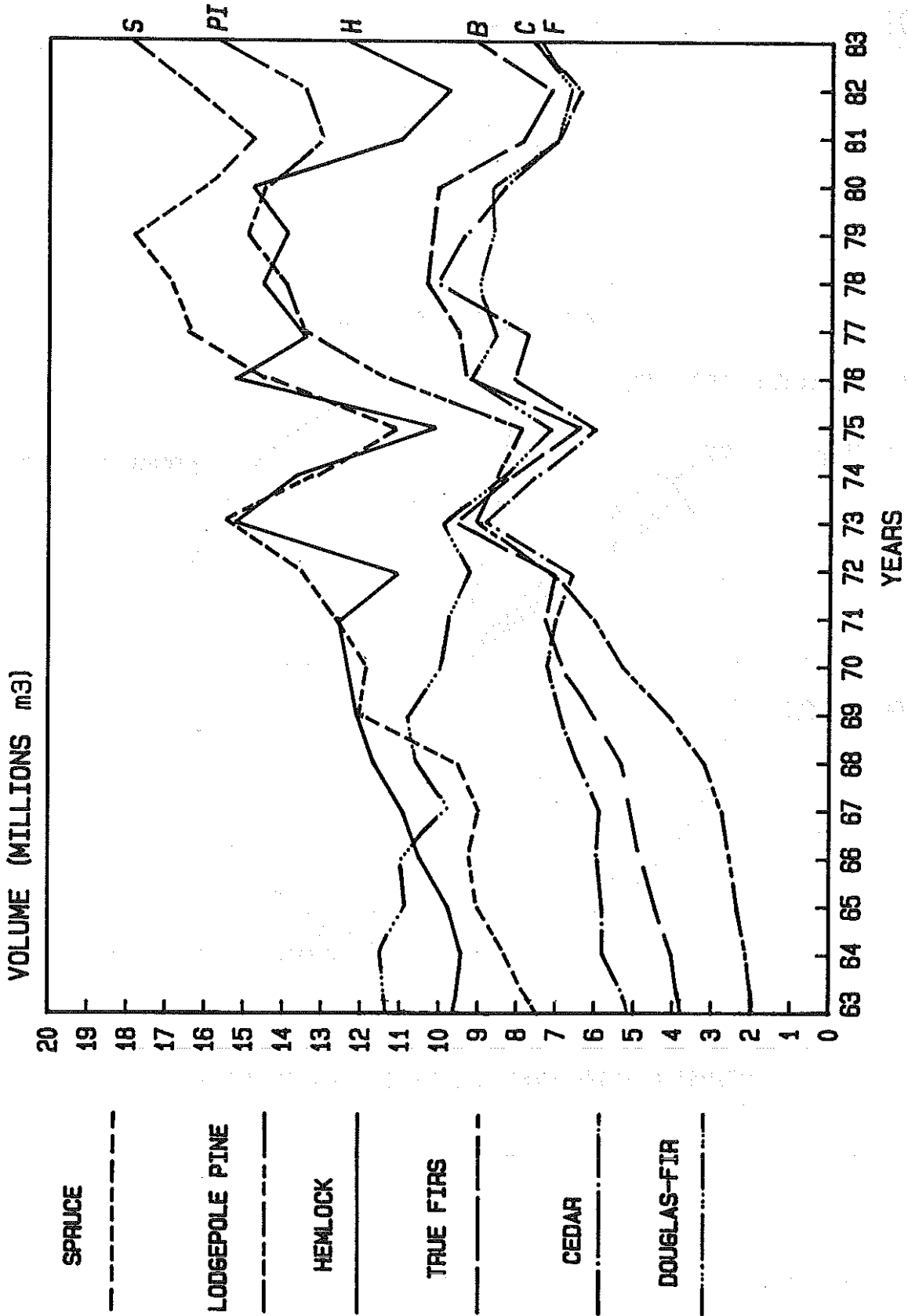
BRITISH COLUMBIA PEST LOSSES

(1979-1983)



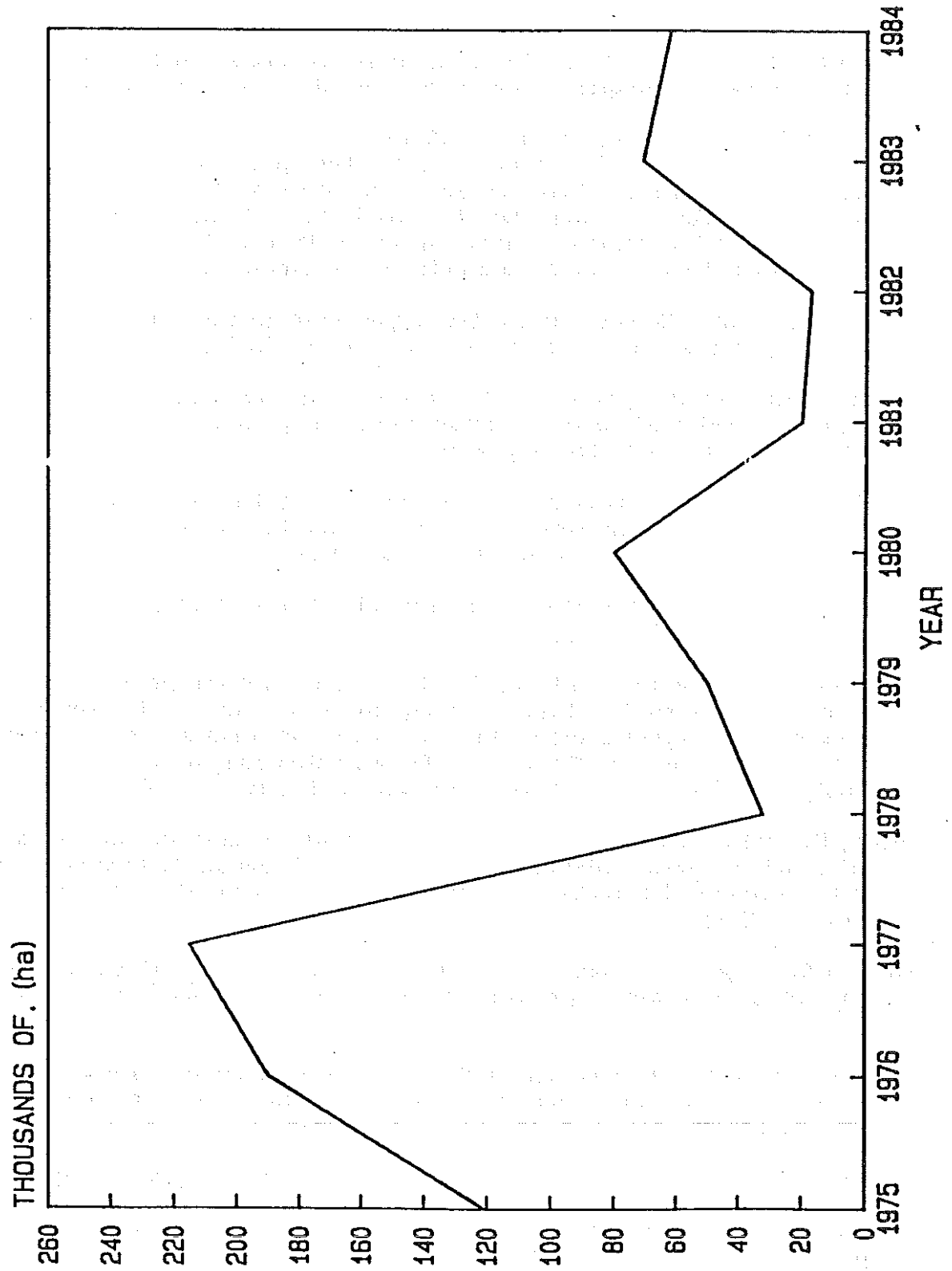
* ESTIMATED TOTAL PEST LOSSES OF 39.8 MILLION m³/YEAR

TRENDS IN SPECIES CUT IN BRITISH COLUMBIA 1963 - 1983 (CALENDAR YEAR)



Source: Canadian Forestry Service
Compiled by P. Humphreys, Protection Branch, Victoria

TRENDS IN VISIBLE DEFOLIATION OF DOUGLAS-FIR
CAUSED BY THE WESTERN SPRUCE BUDWORM IN
BRITISH COLUMBIA (YEARS 1975 - 1984)



Source: Canadian Forestry Service
Compiled by P. Humphreys, Protection Branch, Victoria

PUBLICATIONS AND REPORTS

- Alexander, B.L. 1985. Operational and cost benefit evaluation of a rapattack pest management program. For. Serv. Int. Rep. PM-PB-14, 18 pp.
- B.C. Ministry of Forests. 1984. PestTopics.
(a) Knapweed: B.C.'s Bitter Harvest. PestTopic #13.
(b) Forest Pests and Fire Danger. PestTopic #14.
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