Province of British Columbia
Ministry of Forests

PEST MANAGEMENT PROGRESS

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

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TSA Planning and The Black Book

The Ministry's planning and inventory processes provide means for developing, protecting and renewing our forest resources. Major vehicles are Timber Supply Area (TSA) plans and Tree Farm License (TFL) management and working plans. According to Chief Forester Ralph Robbins,"....implementation will depend on District and Regional Managers using the plans as a basis for developing their program proposals....It is also my intention to use the planning and inventory processes, as documented in the Inventory Manual and the Resource Planning Manual, to develop and maintain these plans."

Mr. Robbins' endorsements clearly identify the need to augment and accelerate our efforts to improve the quality of pest impact information and to have knowledge of the consequences of pest management actions or opportunities. Such information, developed as part of the process and outlined in the plan, is essential for managers to effectively and confidently conduct their programs. Thus, our current initiative to collect the best pest impact and pest management information available for TSA planning purposes becomes even more important than originally expected.

The compilation now underway is designed to permit ready access to summary statements and tabulations on damaging insects and disease agents in each of the 33 TSA's in the province. Regional planning and pest management staff have played a major role in generating the data and in standardizing format. Victoria staff are working to ensure "fit" with the planning and inventory processes. This information base, currently known as the "Black Book," will be an especially useful early reference for specific TSA review purposes, and collectively, it will be particularly useful in developing precision in the provincial overview.

The Black Book information will, in turn, be augmented by special endeavors, including determination of annual allowable cut and harvest schedules as influenced by major pests with or without pest management in place. The combination of useful site-specific information with overview information will maintain the TSA and TFL plans of the future. Much progress has occurred in the past year, and much more is expected after the arrival of regional pathologists and entomologists in the year ahead.

- R.F. DeBoo, Protection Branch, Victoria

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PEST MANAGEMENT PROGRESS

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Publisher's and Editor's Note:

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

Contributions labelled with an appropriate subject heading should be submitted to the Regional Pest Management Coordinator or Advisor who will edit and forward them to Protection Branch. PMP is submitted to the spring (May) and winter (December) meetings of the B.C. Forest Pest Review Committee.

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

PEST MANAGEMENT GENERAL

Advanced Pest Management Course. During the first two weeks of May, 1984, twenty-four candidates from the Ministry of Forests and industry took an 80 hour seminar which constitutes the central third of the Advanced Pest Management Course. The course, sponsored by the Ministry Protection Branch, was presented by N.E. Alexander, Sylva Pest Management Ltd., at the Newton Inn, Surrey. Twenty of these candidates were taking the course as part of their Pupil or Forester-in-Training requirements for registration in the Association of B.C. Professional Foresters.

All Regions were represented at this session and the training and exchange of ideas should pay dividends throughout the Province. Candidates will write their final exam in November, and their professional report will be submitted during the next year, depending on the nature of the subject chosen. To date, more than thirty candidates have completed the accreditation level course since 1982.

- N.E. Alexander, Sylva Pest Management Ltd., Surrey, and J. Muir, Protection Branch, Victoria

Pest Management and TSA Planning. During the past year, the role of pest management in the timber supply area (TSA) plan has been emphasized. Development of a "black book" outlining pest management timber supply planning information was a major achievement. The report documented for each TSA pest management concerns and opportunities.

This successful first approximation was followed by a joint pest managers - planners workshop which examined the need to present pest data in a form which is readily assimilated into the calculation of long-range sustained yield. A format for expressing the impact of pest activity upon wood fibre production was developed as an outgrowth of this workshop.

TSA plans currently being developed reflect the efforts of the past year, and pest management activities have major impact in many of the TSA's currently being reviewed. These developments were actively encouraged by the former Chief Forester, W. Young.

A recent directive of the current Chief Forester, R. Robbins, requiring that TSA plans must, among other things, specify the measures to be taken for developing, protecting and renewing the forest resources, indicates that pest management will play an increasingly important role in TSA planning in the next year.

- J. Crover, Planning and Inventory Branch, Victoria

Kamloops Regional Pest Management Guidelines. Work has continued on the final draft of several sections of these guidelines with the sections on Douglas-fir bark beetle, dwarf mistletoe, Armillaria mellea and Phellinus weirii being completed under a consultant contract. After the final review, they will be distributed for use by District staff.

- R. Edward, Kamloops Forest Region, Kamloops

Reintroduction of Fisher as a Biological Control for Porcupine in the North Coast District. Since the last issue, we have let a contract to an Alexis Creek trapper to live trap 12 fisher - eight females and four males. A price of $300 per animal was the lowest of five tenders received.

A "Porcupine Attack Team" was organized by R. Ellis to review the program, including an on-site visit. This team consisted of Forest Service research biologists and technicians from Victoria, Smithers, Williams Lake, Prince Rupert District staff and a biologist from Fish and Wildlife Branch, Doug Steventon, who has been assigned to assist with this program. Some topics addressed were: survey methods and results, habitat and alternate food sources for the fishers, release sites and sequences, monitoring of animal movements and radio implants to name a few.

Fishers are scheduled to be caught by November 30. Animals will be picked up by the Forest Service and flown to Prince Rupert for radio implants by the local veterinarian, then flown to the site for release shortly thereafter. Monitoring the fisher movements after release is of utmost importance in determining the initial success of the program. We are hoping that the available food source, porcupine, will overcome the trauma of the translocation and the fisher will settle into their new territories.

Cooperation and assistance, including financial participation, has been excellent throughout the Forest Service and Fish and Wildlife Departments. If the fisher is as cooperative, we will be well on our way to controlling a very serious problem on the north coast.

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

Section 88 Activities. Section 88 of the Forest Act provides opportunities for credits to stumpage for licensees according to accompanying regulations. Recent new allocations by government provide significant opportunities for pest management. Particularly, pest surveys and control operations may be enhanced as part of Section 88 agreements.

Ministry pest management personnel are encouraged to work with colleagues in industry to take full advantage of the increased funding now available.

Survey work to augment TSA plans and the "Black Book" compilation as well as priority control operations for bark beetles, dwarf mistletoes and root diseases are recommended.

- H. Doerksen, Protection Branch, Victoria

Regional Forest Entomologists and Pathologists. Staff at Protection Branch and Personnel Services Branch are preparing a staffing plan to acquire the services of these key personnel as soon as possible. At "PMP" printing time, the plan should be in place and action underway to announce the pertinent competitions. It is anticipated that new staff will be in position to participate in plans and operations for 1985.

- R. DeBoo, Protection Branch, Victoria

Western Larch Pests in Vernon District. Western larch trees were subjected to severe disease and insect damage this year in the North Okanagan area. Larch needle blight was prevalent in many of the larch stands. Larch casebearer infested many lower elevation stands and larch budmoth, some high elevation stands.

Our observations suggest that damage will result in growth loss but little or no tree mortality is anticipated.

- E. Haupt, Vernon Forest District, Vernon

Aerial Pest Survey in Nelson Region. The 1984 aerial pest survey for the Nelson Region was funded and coordinated by the region in cooperation with the districts and the Canadian Forestry Service Forest Insect and Disease Survey (FIDS).

A total of 43 hours was flown using fixed wing aircraft. The purpose of the survey was to sketch map bark beetle and defoliator infestations, spruce blowdown areas and other abnormalities that were observed.

The maps produced from the survey are being used to show an overview of current pest damage in each district so that priorities can be given to areas that require more detailed aerial or ground surveys. Normally more detailed surveys will only be done in areas where some type of pest management action is planned.

The maps are also being used to determine the number of hectares infested by each pest recorded, and to show the expansion or decline of infestations on an annual basis. Number of hectares of bark beetle infestations recorded 1984 are shown in the following table.

Forest District	Mountain Pine Beetle	Spruce Bark Beetle
Cranbrook	3 600	576
Invermere	14 347	19
Golden	517	0
Revelstoke	42	1 652
Arrow	493	376
Boundary	1 024	0
Kootenay Lake	574	887
Total	20 597	3 510

During the aerial surveys, we also detected infestations of insect defoliators and foliage diseases as shown in the following table.

	Foliage Pests[1] (No. of ha)				
District	B.H.B.	L.N.C.	L.B.M.	L.C.B.	L.S.F.
Revelstoke	12 359				
Golden	1 664				
Arrow	1 230	4 343	207		
Cranbrook				41 000	3 008
Kootenay Lake		3 176		3 100	
Boundary		12 853			
Total	15 253	20 372	207	44 100	3 008

[1]Abbreviations used are: B.H.B. - Blackheaded budworm, L.N.C. - Larch needle cast, L.B.M. - Larch budmoth, L.C.B. - Larch casebearer, and L.S.F. - Larch sawfly.

- E. Morris, Nelson Forest Region, Nelson

Glossary of Forest Pest Management Terms. The glossary prepared by Laura Doliner and John Borden of Simon Fraser University under the auspices of the B.C. Forest Pest Review Committee and the Ministry of Forests will be on sale at the Queen's Printer (563 Superior Street, Victoria, V8V 4R6) and at Worldwide Books and Maps (949 Granville Street, Vancouver, V6Z 1L3). Price is $4.00 per copy.

- R. DeBoo, Protection Branch, Victoria

Pest Management Section 88 Projects - Vancouver Region. Currently, eleven Section 88 pest management projects are scheduled to be completed this year:

Sitka spruce weevil surveys - 4 projects
Sitka spruce weevil clipping - 5 projects

White pine pruning - 1 project
Pest detection flight - 1 project

Additional survey and pruning proposals are expected within the fiscal year.

- D. Heppner, Vancouver Forest Region, Burnaby

Nonsalvable Losses. One of the most difficult problems facing pest managers is the determination of the impact of insect and disease losses on the long run sustained yield of a Timber Supply Area.

Research by Darrell Errico of Research Branch and Dr. Bill Reid of the University of Victoria should help to determine insect and disease impacts. They have developed a single stand model and a whole forest model which "model" the random losses caused by forest fires.

In the Fort Nelson TSA, for example, the average annual fire loss on good and medium spruce sites with medium access to the mills is 0.36% of the area in the type per year. The resultant impact on long run sustained yield is 17% reduction.

A number of pest management problems may be amenable to modelling of their impact using this tool. A publication, "The Impact of Forest Fires in the Fort Nelson TSA" can be obtained from Darrell Errico, Research Branch, Victoria.

- D. Gilbert, Protection Branch, Victoria

Pest Management Information System. The task force to outline desirable features for a pest management information system was reactivated in September 1984 upon the return of the chairman, R. Sutton, from other duties. The group which includes R. Cozens, Prince George, P. Wood, Vancouver, R. Sutton, Victoria, and T. Shore, Canadian Forestry Service, intends to complete their report and provide recommendations as scheduled by April, 1984.

- R. Sutton, Protection Branch, Victoria

FOREST ENTOMOLOGY

Bark Beetle Funding. Cariboo Region made a presentation to the Ministry Executive in early 1984 detailing the need for an expanded development program to access the western supply blocks of the Quesnel Timber Supply Area (TSA). This program was deemed necessary to access extensive timber volumes killed by or at risk to mountain pine beetle.

Subsequently, all forest regions estimated funding needed over a five-year period to reduce the rate of spread of mountain pine and spruce beetle infestations. A total of approximately $50 million was required, with the

greatest expenditure required in the first three years and declining slightly in the last two. Programs included access construction and upgrading, aerial and ground detection, redirection and accelerated harvest, and single tree treatments.

In October, 1984, approval was given to expend $5 million in fiscal year 1984/85 on bark beetle related activities. Specific project proposals were developed by district and regional staff. By the end of October, 115 individual projects had been approved for a total expenditure of about $4.7 million. The remaining balance will be allocated by the end of 1984.

Submissions have been made for continued funding for fiscal year 1985/86 and future years' programs should be a part of the regular Ministry budget.

- P. Hall, Protection Branch, Victoria

Cariboo Bark Beetle Control Program. Cariboo Region submitted a brief titled "Roads West" to Ministry of Forests Executive in March 1984. This brief was a request for special funding for road construction to harvest the mountain pine beetle killed pine in the west half of the Quesnel T.S.A.

The brief received favorable reviews; however, Ministry Executive felt that the Cariboo beetle problem could not be dealt with in isolation, as most Regions in the Province also had bark beetle epidemics. Protection Branch presented an overall request for special funding for management of bark beetles to the Ministry of Forests Executive which was approved by Treasury Board.

Cariboo Region received an allotment of $1.55 million on October 5, 1984. Most of this funding will be used to develop access into already infested or threatened areas so that forest values will not be entirely lost. Additional projects included aerial and ground survey and some single tree treatments in priority areas.

- D. Doidge, Cariboo Forest Region, Williams Lake

Emergency Bark Beetle Funding, Nelson Region 1984/85. A total of 34 bark beetle projects have been approved under the emergency bark beetle program for the Nelson Region, with an estimated cost of $806,000. The work on these projects has started and will be completed by March 31, 1985. Eighteen of the projects are for mountain pine beetle and 16 for spruce bark beetle control. The funds will be used to provide access into infested stands ($350,000), helicopter reconnaissance ($50,000), ground surveys ($360,000), equipment ($20,000) and bark beetle pheromones ($24,000). The number of projects and allotment for each district are shown in the following table.

District	Number Projects	Allotment
Cranbrook	11	$223,505
Invermere	8	272,547
Golden	4	60,030
Arrow	5	18,194
Kootenay Lake	3	194,790
Boundary	3	37,500
Total	34	$806,566

- E. Morris, Nelson Forest Region, Nelson

Kamloops Special Bark Beetle Funding. With special funding of approximately $700,000, eleven projects have been approved for this fiscal year. Activities to be carried out with this much needed money include access construction, road upgrading, aerial and ground detection, single tree disposal and purchase of pheromone for the next season.

- R. Edward, Kamloops Forest Region, Kamloops

Bark Beetle Detection and Control Projects underway in the Prince Rupert Forest Region. With the allocation of $1,350,000 for bark beetle control by special emergency funding, the continuing control programs in the Prince Rupert Forest Region were given a much needed financial boost. At the present time, there are 30 projects with allocations as follows:

Region	2 projects (colour photography)	$ 119,950
Lakes	8 projects	111,785
Morice	7 projects	210,093
Bulkley	5 projects	442,338
Kispiox	6 projects	212,000
Kalum	2 projects	26,204
Total	30 projects	$1,122,370

The remainder of the allocation will be completed with a further 11 projects to be submitted shortly.

The largest portion of the allocations for each project will be utilized in single-tree fell and burn projects handled by public competition contracts. It is estimated there will be 100 contracts issued this winter.

This special funding has come at a most opportune time as far as control with single tree fall and burn is concerned. Mountain pine beetle is the first priority in this Region. At the present time when the beetle is at an "off cycle" situation, the spread rate of one red to one green infested tree will give us a chance to clean up many small active infestations before faster spread rates can occur.

With the continuing availability of special funding, we should be able to coordinate our harvesting, single tree and pheromone control programs and thus slow down the losses to mountain pine beetle. These programs should reduce the eventual shortfall of timber volume that we have been facing with the loss of our mature pine stands.

- V. Barge, Prince Rupert Forest Region, Smithers

Emergency Bark Beetle Program - Vancouver Region. Four bark beetle projects under the Emergency Bark Beetle Program are underway in the Vancouver Forest Region. Three projects involving the removal of mountain pine beetle and Douglas-fir beetle infested timber are situated in the Squamish Forest District and one in the Chilliwack District.

- D. Heppner, Vancouver Forest Region, Burnaby

Cariboo Regional Aerial Insect Surveys. Cariboo Region again carried out a detailed detection survey using grid flying and 1:40,000 maps. This survey, covering priorized areas, is extremely valuable to the Districts as it provides up-to-date, accurate data for directing harvesting and other activities.

Canadian Forestry Service Forest Insect and Disease Survey (FIDS) Rangers R. Andrews and R. Wood surveyed the Chilcotin mountain pine beetle infestation using 1:100,000 maps, because only general information was required about this area of the infestation. FIDS Rangers also surveyed and mapped the Bowron Park and the western spruce budworm infestation near Clinton. By cooperation with the C.F.S., maximum area coverage was achieved with minimum expenditure and duplication.

Bark Beetle Losses

	1983		1984	
	Area (ha)	Volume (m^3)	Area (ha)	Volume (m^3)
Lodgepole pine	374 300	3 360 300	422 100	3 707 400
Spruce	3 590	115 300	1 402	57 100
Douglas-fir	19 500	326 800	1 900	14 100
Subalpine fir	450	2 900	570	4 700
Total	397 840	3 805 300	425 972	3 783 300

Defoliators

	1983 Area (ha)	1984 Area (ha)
Western spruce budworm - Douglas-fir	18 500	18 800
Two-year spruce budworm - Alpine fir, spruce	190	200
Douglas-fir tussock moth - Douglas-fir	170	--
Western hemlock looper - Hemlock, cedar	--	5 250

As shown in the table, the 1984 aerial survey results indicated that the mountain pine beetle infestation had intensified in the areas of the 1983 "jump" (Ed. note: See PMP Vol II, No. 2, p. 9-10, 1983), the west half of the Quesnel T.S.A. The infestations also continued to move northward in the Chilcotin and Quesnel Forest Districts and eastward in the Williams Lake, 100 Mile House and Horsefly Forest Districts.

- D. Doidge, Cariboo Forest Region, Williams Lake

Aerial Sketch Mapping in the Prince George Forest Region. Three pest management staff of the Prince George Forest Region attended a one day aerial sketch mapping course in Williams Lake in June 1984. Personnel of the Cariboo Forest Region instructed a half-day classroom session on methodology and compilations followed by an afternoon practicum in a fixed-wing aircraft sketch mapping at a scale of 1:40,000.

Prince George Regional staff subsequently accompanied and assisted pest management personnel from five forest districts in aerial sketch mapping portions of their districts in September 1984. The Prince George Region considers sketch mapping at 1:40,000 scale as an important complement to the mapping at 1:250,000 done annually by the Forest Insect and Disease Survey Unit of the Canadian Forestry Service.

- D. McNeil and R. Hodgkinson, Prince George Forest Region, Prince George

Prince Rupert Aerial Detection of Mountain Pine Beetle, Spruce Beetle and Balsam Bark Beetle Infestations. Overview aerial surveys using fixed-wing aircraft were conducted in the Kalum, Kispiox, Bulkley, Morice and Lakes Forest Districts by district protection staff. In each district, infestations of mountain pine beetle, spruce beetle and balsam bark beetle were sketch mapped and recorded. Subsequently, at a meeting with all districts at the regional office, strategies were formulated and ground probes were scheduled. The district staff then met with members of forest industry to coordinate probing and ground probing activities which are presently underway.

- V. Barge, Prince Rupert Forest Region, Smithers

Haul Routes. The Cariboo Region instituted a limited closure of log haul routes in 1984 because of the large bark beetle flight that occurred in 1983 and the subsequent spread of the mountain pine beetle infestation in some districts. Each forest district instituted hauling restrictions tailored to its particular beetle problem.

Quesnel and 100 Mile Districts closed all haul routes but then made site-specific exceptions if the area being logged met a certain set of requirements, such as, the area had only a light infestation and the logs had to be "hot milled."

A further precaution taken in the 100 Mile District by Ainsworth Lumber Company was an experimental use of Lindgren Funnel Traps around their log decks at 100 Mile House and Chasm.

- D. Doidge, Cariboo Forest Region, Williams Lake

Salmon Arm District Battles Beetles. In the spring of 1983, numerous small outbreaks of mountain pine beetle (MPB) were identified in the China Valley area. A total of 2 500 ha was surveyed to determine the extent of the attack. By fall, numerous small patches had been harvested under cutting permits and small business sales. Over the winter, a plan was developed with proposed road layout and cut blocks identified to remove the attacked and susceptible pine.

As the area affected is an important watershed, a public meeting was held in February to inform local residents of what was taking place. The biology of the mountain pine beetle was explained and the proposed action plan was shown to them. The presentation received a very favourable response from the local residents.

In April of 1984, harvesting commenced with several large companies as well as small business operators participating. These efforts were closely coordinated with the activities in adjacent areas of the Vernon District.

By late May pheromone baits had been placed in areas that were not expected to be harvested by flight time. 75% of the area was harvested prior to flight time and most of the remaining area has been logged since. The final operations should be completed before the spring 1985 flight.

The pheromone baiting was very successful in luring the beetles in the areas to be harvested.

The entire program was considered very successful and was only possible through the cooperation of two logging companies, Crown Forest Industries Ltd., and Federated Cooperatives Ltd., and staff from Canadian Forestry Service, Kamloops Forest Region, Salmon Arm and Vernon Forest Districts.

- W. Langlois and H. Drage, Salmon Arm Forest District, Salmon Arm

Mountain Pine Beetle Life Cycle. The life cycle of the mountain pine beetle in the Bulkley Timber Supply Area appears out of phase due to wet and cool summers. Many trees this fall have pupae in them, as well as adult beetles, callow adults and some larvae. This is mostly the result of strip attack and late flights. Many trees were attacked so late this fall that there are no pitch tubes, only frass as evidence of current attack. This has slowed the progress of our probe surveys.

Based on the ratio of green to red attacked trees, the current attack, a 1:1 ratio, is down from last year, a 3:1 ratio. However, there is still a large residual population of healthy larvae that could continue the epidemic if we get a normal warm spring and dry summer next year.

- D. Nelson, Bulkley Forest District, Smithers

Fall and Burn Contracts to Control Mountain Pine Beetle. Bulkley Forest District treated 3,400 trees last winter at an average cost of $14.69 per tree. Of these, 2,100 were felled and burned by contractors, the remainder by Canada Works crews and hired crews.

The production rate by contractors was roughly double that of the other crews and about one-quarter of the anticipated cost.

As a result of last year's success, we will be treating approximately 7,000 trees this winter by fall and burn contract, 3,000 of which will involve helicopter access. Layout work is presently underway. The present economic climate and the resulting abundance of ambitious entrepreneurs make contracting of labour-intensive pest work, based on selected invitations to bid, an efficient use of the 1984 special warrant funds.

- D. Nelson, Bulkley Forest District, Smithers

Colour Photography used in Detection and Control Projects in the Prince Rupert Forest Region. In conjunction with the aerial detection surveys, a program was initiated to photograph all mountain pine beetle infestations in the Lakes, Morice and Bulkley Forest Districts. The projects were funded under a program of credits to stumpage (Forest Act, Section 88) and emergency bark beetle funding. Although the season for colour photography was drawing to a close, the weather cooperated and the project was completed.

The colour photographs should prove invaluable for the detection and control projects that are presently underway. For example, in many single tree fell and burn projects in the remote Babine Lake area, the colour photos already have been used to lay out these projects at a considerable savings in time and money.

- V. Barge, Prince Rupert Forest Region, Smithers

Operational Trial of Colour Infrared Photography to Detect Green Attack Mountain Pine Beetle Infestations. The trial went ahead as planned under contract to Timberline Forestry Services of Vancouver. The project was carried out in the Morrison Lake area of the Morice Forest District, Prince Rupert Forest Region, September 10-16, 1984.

Analysis and interpretation of the photos together with correlation of field ground sample data are currently in progress. The final technical report on the project will be completed by mid-February 1985.

- P. Pashnik, Prince Rupert Forest Region, Smithers

Space Shuttle Beetle Detection Project Scuttled. The space shuttle bark beetle detection experiment using a large format camera with colour infrared and natural colour film was scheduled for August 1984, but did not go ahead as planned. This was due to two aborted missions earlier in the year coupled with repriorization of payloads. Hence this experiment was dropped. It may be rescheduled as part of a future mission, since the camera gear and other equipment are still on hand for the experiment.

- P. Pashnik, Prince Rupert Forest Region, Smithers

Mountain Pine Beetle Program in Vernon Forest District. Mountain pine beetle infestations are still on the increase in lodgepole pine stands in the Vernon District. Ministry and industry staff are presently making a concerted effort to survey, evaluate and undertake control measures to contain the expanding populations. Many of the current infestations are within important watershed and recreational areas.

- E. Haupt, Vernon Forest District, Vernon

Manning Park Mountain Pine Beetle Control Project. In support of a continuing program by Ministry of Lands, Parks and Housing, Parks Branch, to control mountain pine beetle in Manning Park, Vancouver Region Protection staff in November will visit the previously treated area near the east gate entrance on Highway 3 to assess the infestation. Parks staff have reported new infestations within the Park, and numerous infestations are known in the Merritt Forest District, Kamloops Forest Region, within 16 km distance from the park boundary. These infestations are of considerable concern as possible sources of reinfestation after the recent control efforts within the Park.

- D. Heppner, Vancouver Forest Region, Burnaby

Use of Mountain Pine Beetle Pheromone. From results of previous trials and operational use, pine beetle pheromones appeared successful when used to limit beetle dispersal out of proposed cutblocks or to mop up single tree treatment areas.

It is expected that pheromone usage will increase greatly as a result of the expanded bark beetle program. Protection Branch will coordinate requests for pheromone purchase to take advantage of any bulk order cost advantage. Acceptable uses of pheromone lures are to enhance the effectiveness of harvesting and single tree treatment. The use of Lindgren or other trapping devices will not be considered at this time except for some testing or monitoring purposes.

- P. Hall, Protection Branch, Victoria

Use of Mountain Pine Beetle Pheromones in Cariboo Region. In the Horsefly Forest District at Bells Lake, a containment trial was conducted in 1984 in a small block of mountain pine beetle-killed pine. The operator knew he would be unable to complete harvesting the area before the beetle flight.

A double line of pheromone capsules were placed along the south side of the block, and a single line of capsules were placed along the west side. The other sides of the area were immature pine and swamp.

The area was examined after the beetle flight and the containment was judged successful as no beetle attack was noted past the pheromone barriers.

Cariboo Region intends to use more pheromone baits in 1984, mostly for concentration of beetle populations into cutblocks that will be logged after the beetle flight.

- D. Doidge, Cariboo Forest Region, Williams Lake

Use of Pesticides and Pheromone to Control Small Infestations of Mountain Pine Beetle. Single trees infested by mountain pine beetle (MPB) are usually treated by felling and burning but this treatment cannot be safely undertaken in some circumstances. An alternative method was tested in cooperation with J. Borden, Simon Fraser University, to treat single trees in periods unsuited for burning.

In three patches of beetle-attacked lodgepole pine, 62 green attacked trees were marked for treatment.

On July 9, 1984, the rapattack (rappel) crew, using a helicopter, deployed canflex bags of water, the carrier for Sevin® insecticide, on two of the sites that were not near any natural water source.

On July 10, rapattack crews felled and treated the 62 marked trees with Sevin to kill the inhabiting beetles. Several susceptible trees adjacent to the treated trees were baited with MPB pheromone to monitor the effectiveness of the treatment. Total time to complete this phase of the project was 10 hours.

On August 28, the sites were re-examined to determine the effectiveness of the Sevin treatment and to treat any newly attacked trees with monosodium methane arsenate (MSMA).

The results were very gratifying. The Sevin treatment appeared to have greatly reduced the emerging population of beetles. The survivors, combined with beetles from the local endemic populations, attacked only 40 adjacent baited and unbaited trees - 12 severely attacked and 28 lightly attacked.

Treatment costs were:

Fell, treat and bait 62 trees -	$3,555.00	($57.34 per tree)
Assess and treat 46 trees with MSMA -	$ 430.50	($9.36 per tree)

Further work on this technique is planned for 1985, and a complete report is available.

- T. Lacey, Merrit Forest District, Merritt

Use of Mountain Pine Beetle Pheromone Baits in Kamloops Region. During the past season, Forest Service and industry undertook a fully operational pheromone baiting program. The first objective was to concentrate mountain pine beetle population in areas that could not be harvested prior to flight time. The second objective was to monitor the effectiveness of single tree disposal projects.

Preliminary results indicated that the program was effective and should continue. Further analysis of results will be conducted this winter to better quantify the effectiveness of this new tool.

- R. Edward, Kamloops Forest Region, Kamloops

Pheromone Lures for Mountain Pine Beetle. Pheromone baiting for mountain pine beetle was conducted on an operational basis for the first time in Vernon District this year. Forest Service and industry personnel deployed 1150 lures on various infestation sites throughout the district.

Results were encouraging. In nearly all cases trees with the lures were the first ones to be attacked. Once the lure trees were fully attacked, adjacent trees were subsequently attacked. The lures definitely controlled the spread of the insects from epicenters.

The lures were also placed around the outer edge of an infested ecological reserve where no control work is permitted. A significant portion of the beetle population were drawn out of the reserve to areas where control action could be undertaken.

- E. Haupt, Vernon Forest District, Vernon

Mountain Pine Beetle Lures. One hundred fifty hectares of lodgepole pine infested with mountain pine beetles were baited with mountain pine beetle lures this spring in an attempt to prevent the flight of beetles out of infested blocks prior to completion of harvesting this fall.

Under the recent special funding program, the Nelson Region expects to employ more than 4000 lures to aid control harvesting projects in 1985-86.

- D. Gray, Nelson Forest Region, Nelson

Use of Lindgren Funnel Traps to Collect Mountain Pine Beetles from Log Decks during Beetle Flight Period. On July 5, 1984, 32 Lindgren Funnel Traps were set up at the Ainsworth Lumber Yard in 100 Mile House. The traps were set on tripods or hung in lodgepole pine trees approximately 25 metres apart around the perimeter of the log yard. Insects were collected every 2-3 days.

Many species of insects were trapped including those identified by D. Doidge as: red bellied clerids, Homoptera sp., Chyptorhynchus (poplar willow borer), Buprestidae sp., Xylotrechus sp., Pissodes sp., horntails and many others unidentified. A total of 718 mountain pine beetles were collected. Some green attack of trees was noted near the traps.

Approximately 64 man hours were needed to collect insects, and set up and service the traps. Approximate costs in addition to the traps were $700 for labour and $50 for vehicle gasoline.

Some of the problems encountered were: when hanging the traps on tripods, the tripods should be staked to the ground to ensure they do not fall over and damage the traps; fly ash from the burner plugged some of the traps; and traps should be checked and maintained regularly.

It was difficult to judge the success of this venture as this was the first year it was used, but it did attract beetles. Beetle numbers presumably will vary from year to year depending on the amount of beetles in infested wood that is in the mill yard during beetle flights. Peak flight periods were July 11-16 and July 30-August 3 at the trap locations.

- T. Larsen, 100 Mile Forest District, 100 Mile House

Spruce Beetle Pheromone Trial. Northwood Pulp and Timber Ltd., Ministry of Forests and the Canadian Forestry Service are cooperating in a trial to determine the effectiveness of using pheromones (mixture of frontalin and alpha-pinene) to arrest dispersal of spruce beetle out of proposed cutblocks and concentrate beetle attacks on standing trees. If successful, this technique should enhance the effectiveness of sanitation harvesting in removing beetle populations and reducing subsequent attack levels. Initial results appear promising but a more comprehensive analysis is needed.

- P. Hall, Protection Branch, Victoria

Lethal Spruce Beetle Traps and Guide Outfitters. In response to concerns from a local guide outfitter regarding the re-opening of access into a valued drainage to facilitate a proposed spruce beetle trap tree program, a lethal trap program was adopted for Foisey Creek in the Flathead Valley.

It was pointed out that local guides would be well advised to report any bark beetle activity while it is still in the early stages so that options such as the above can best service all parties concerned.

- S. Byford, Cranbrook Forest District, Cranbrook

Kootenay Lake District Pest Management. Pest management activities in the Kootenay Lake District continue to focus on control and salvage logging programs in mature spruce balsam types.

A cooperative cost-sharing, lethal trap tree program was conducted on Darkwoods Forestry private land and on Crown land in the Toby Creek drainage. Lethal trap trees treated and felled adjacent to active infestation pockets in the spring of 1984 successfully absorbed the 1984 spruce bark beetle flight. Examination of bark samples from the lethal trees indicated that brood production was unsuccessful in treated trees.

In the Upper Duncan River, a combination of a non-lethal trap tree program, pre-falling prior to the 1984 flight, and salvage logging has successfully contained the 1984 spruce bark beetle flight from an infestation adjacent to Glacier National Park.

- M. Pascuzzo, Kootenay Lake District, Nelson

Monitoring of Douglas-fir Bark Beetle in an Experimentally Harvested Area to Maintain Mule Deer Habitat. To develop better methods for integrated management of dry belt Douglas-fir in the Cariboo for timber and wildlife, an operational project was undertaken in 1983 by Research Branch, Cariboo Forest Region, and Ministry of Environment, Fish and Wildlife Branch. Twenty-five hectares were harvested by marking individual trees using criteria based on deer requirements, silviculture and timber harvesting. If the method is economically feasible and maintains acceptable winter habitat, then a larger experimental harvest will be undertaken with a formalized assessment of mule deer response.

This type of harvesting potentially could result in Douglas-fir beetle infestations which have been experienced in similarly harvested, dry-belt stands. Following initial inspections which indicated some beetle attacks in 1984 and a request by Williams Lake Forest District Manager S. Carr, Dr. Les McMullen, Canadian Forestry Service, Pacific Forest Research Centre, visited the area. He reported that although there was no current beetle infestation, conditions on the area such as large mature trees, damage to trees along skid road and piling slash against residual trees were conducive to outbreaks and should be avoided.

Further monitoring of this and similar areas is planned to detect beetle infestations. Cariboo Region has advocated destroying or removing large pieces of slash and using trap trees in these areas to reduce beetle populations.

- D. Doidge, Cariboo Forest Region, Williams Lake

Lethal Trap Trees for Douglas-fir Beetle. In the Prince George West Forest District, an operational trial was undertaken to test the silvicide monosodium methane arsenate (MSMA) in lethal trap trees to "mop-up" a small infestation of Douglas-fir beetle.

In early May 1984, a chainsaw with a short bar was used to cut through the thick outer bark of 25 large diameter Douglas-fir. An axe was then used to carefully cut into the cambium tissue. On 20 trees MSMA at 80 g/l a.i. (one-quarter strength) was applied to the frill (cuts) and the remaining five trees were left untreated to serve as checks. All 25 fir were felled two weeks later.

Efficacy sampling was conducted in late August 1984 and phloem samples will be sent to the B.C. Ministry of Environment laboratory at University of B.C. for analysis of arsenic. Although the data have not been fully analyzed, field observations suggest that a higher dosage of MSMA is required for Douglas-fir beetle. A complete report on this trial will be available in early 1985.

- R. Hodgkinson, Prince George Forest Region, Prince George, and B. Doerksen, Prince George West Forest District, Prince George

Trials to Control Cone and Seed Insects. In trials at Cowichan Lake Research Station in 1983, stem injections of Metasystox-R® reduced Douglas-fir cone gall midge populations by 89.3%. Injections were made at 15 cm intervals around each tree using 2 ml Mauget Injecticide® capsules. The cost of application varied with the size of the tree but ranged from $8.00-$9.00 for trees with a circumference of 60-90 cm.

Metsystox-R® was also effective against the midge as a 0.5% or 1.0% foliar spray in the Quinsam seed orchard. Populations were reduced 100% by either rate. Operational costs for foliar sprays were approximately $2.00-$3.00 per tree.

These trials were repeated in 1984 to see if the results were consistent and comparable between years. Details should be available by the spring of 1985.

- D. Summers, Silviculture Branch, Victoria

Gypsy Moth Program. Treatments to eradicate gypsy moth in Ft. Langley and Courtenay were carried out by Agriculture Canada and the Municipality of

Courtenay in 1984. No moths have subsequently been trapped in Ft. Langley; several moths have been trapped in Courtenay, indicating further treatment required in 1985. The Ministry of Forests is planning to assist in the 1985 survey by placing and retrieving pheromone traps in heavy-use forested areas. This expanded survey should help detection of any substantial gypsy moth populations in B.C.

- P. Hall, Protection Branch, Victoria

Douglas-fir Tussock Moth. As predicted by the Canadian Forestry Service, Insect and Disease Survey, the recent tussock moth infestation in Kamloops Forest Region collapsed in 1984. Protection Branch is exploring possibilities for securing a stock of tussock moth NP virus (now registered for use) in anticipation of the next cyclic infestation. Annual aerial and pheromone surveys will continue to detect future infestations at an early stage.

- P. Hall, Protection Branch, Victoria

Control of Black Army Cutworm on a Douglas-fir Progeny Test Site in the Cariboo Forest Region. Black Army Cutworm (Actebia fennica) was discovered in a Douglas-fir progeny trial plantation near Mitchell Bay, Quesnel Lake, in May, 1984. This area is one of six test sites established to assess the genetic potential of selected parent trees. The results of these outplantings will be used to select superior parent trees and provide data for the interior Douglas-fir improvement program.

R. Andrews, Canadian Forestry Service, Forest Insect and Disease Survey, assessed cutworm damage to the seedlings on May 19 as:

Damage Category	Seedlings (%)
Healthy	75
Trace Feeding	19
10-50% Defoliation	4
More than 50% defoliation	2

Samples of soil litter and humus layers indicated that the larvae had developed to the fourth to sixth instar stage and that feeding would continue for two more weeks.

The Douglas-fir progeny test seedlings were extremely valuable because of the investment in their production, planting, and site preparation and the expected information to be collected from them. In order to protect as much of this investment as possible, it was decided to spray the plantation with the insecticide Ambush® to control the insect epidemic.

Pesticide was applied using Solo® backpack sprayers on May 25, 1984, according to the product specifications and other regulatory requirements.

Sampling results after the spray showed that the population level of cutworms was reduced. There were approximately six times more larvae outside than within the sprayed area.

Larval feeding continued as expected because the cutworm was not completely eliminated. The pesticide had some repellent action as well and so protected seedlings more than just killing larvae.

A more detailed report of the project is available.

- D. Doidge and W.K. Mitchell, Cariboo Forest Region, Williams Lake

Mortality of Black Army Cutworm in Prince George Forest Region. In mid-June 1984, black army cutworm larvae were collected from two recently infested cutblocks in the Prince George West Forest District. Both blocks had been logged in the winter of 1981-82, broadcast burned in the fall of 1982, and partially planted in the summer of 1983.

Larvae were brought to the regional office and placed in screened rearing cages with soil and herbaceous plants. Temperature and humidity were maintained at constant levels, and pupation was well underway by June 15th. The first emerging moths were noted 20 days later on July 5th.

On July 24th, the cages were opened and a classification of the emergence was undertaken. Adult parasites and unsuccessful black army cutworm larvae and pupae were sent to the Forest Insect and Disease Survey Unit of the Canadian Forestry Service for identification and/or determination of mortality.

A table summarizing results of the rearing project and mortality is presented in the Tabulation and Graphics Section. Only 7-9% of the insects successfully emerged.

A re-examination of these cutblocks in 1985 will provide useful information on the impact of the heavy natural mortality of black army cutworm encountered in 1984. Contact the undersigned for further information.

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

Douglas Fir Tussock Moth Population Collapses. Results of our fall 1983 egg mass surveys which indicated a collapse of Douglas-fir tussock moth population due to virus were substantiated.

Except for a few trees lightly attacked this year near Vernon, the population totally collapsed in the Vernon District this year.

- E. Haupt, Vernon Forest District, Vernon

Spruce Leader Weevil Sampling Technique. A cooperative study involving Protection and Research Branches has been initiated to review various sampling techniques to estimate the proportion of weeviled leaders in a plantation. A major goal is to provide a statistically sound yet operationally efficient sampling method.

The study will consist of a review of current literature and consultation with sampling specialists and entomologists familiar with Pissodes strobi. Collection and analysis of some weeviled plantation data, e.g., stem maps, will also be undertaken to permit realistic computer simulation of candidate sampling schemes. A report will be issued at the conclusion of the study outlining its findings and recommendations.

- V. Fletcher, Research Branch, Victoria, and R. DeBoo, Protection Branch, Victoria

Assessment of Damage to Sitka Spruce caused by Pissodes strobi. This study initiated by R.O. Alfaro, E. Wegwitz and R.G. Brown, Canadian Forestry Service, now is being supported by the Ministry of Forests. The purpose of the study is to classify the types of defects caused by weevil attack such as crooks, creases and forks, and to estimate quality and volume losses due to these defects.

Field work is now complete and data are being prepared for analysis. Data were collected from a 30 year old stand with records of each weevil attack. The study will be expanded to include mature timber to enable prediction of damage to the mature timber. Preliminary results will be available in early 1985, while results for mature timber will be available in late 1985.

- K. Kassay, Vancouver Forest Region, Burnaby

Surveys for Pissodes strobi in the Mid-Coast Forest District. Sitka spruce plantations on 3168 ha in the Mid-Coast Forest District have been surveyed, in conjunction with regeneration assessments, for Pissodes strobi. Surveys were conducted by Duncan Forest District staff on loan to the Mid-Coast Forest District.

The Dean River-Kalone Creek-Nooskula Creek area was found to be weevil-free. No present or previous weevil attack was noted within the Quatlena drainage. The Necleetsconnay drainage, however, was found to contain high levels of weevil infestation.

This information enhanced our understanding of the distribution of Pissodes strobi within the Vancouver Forest Region. Because weevil infestation corresponded to zones as predicted by Vancouver Region Research staff (based on climatic zones), the development of planting recommendations for sitka spruce can be refined in view of the risks of weevil attack. Furthermore, based on these extensive spruce weevil surveys, pest management recommended to

the Vancouver Region Stock Coordinators meeting this summer that sitka spruce no longer be planted in selected areas of the region. Consequently, of the two million sitka spruce seedlings in the nurseries, most were reallocated to "safe" areas in the Mid-Coast District. Those that could not be reallocated, about 50,000 seedlings, were destroyed.

- D. Heppner and P. Wood, Vancouver Forest Region, Burnaby

Port McNeill Weevil Work.

1. Sampling for Pissodes strobi Attack. In the Port McNeill Forest District, 459 ha of sitka spruce plantations have been surveyed to determine the current level of attack by Pissodes strobi. This follows two years of extensive work in which a total of 3 200 ha were surveyed by the MOF.

2. Leader Clipping for Control of Pissodes strobi. During August, sitka spruce trees in a 385 ha plantation at the Klinnaklinni River were clipped to control spruce leader weevil. Trees in a 92 ha plantation were clipped in the Seymour River drainage. Surveys and further clipping within these treated areas are planned for 1985.

- S. Gripich, Port McNeill Forest District, Port McNeill

Spruce Weevil Clipping in Kalum Forest District. Following a resurvey of valuable spruce plantations in the Kitimat River Valley and the Terrace area, a clipping control project was initiated. A total of 3600 leaders infested by spruce weevil (Pissodes strobi) was clipped on 470 hectares. These surveys of infestation and the control program were carried out by crews funded by the Employment Bridging Assistance Program. These infested trees are situated on the highest quality growing sites within the Kalum Forest District.

- B. Simpson and V. Barge, Prince Rupert Forest Region, Smithers

Control of Pine Terminal Weevil, Pissodes terminalis, by Leader Clipping. A small experiment was started in 1982 to test the practicality and biological feasibility of controlling low level Pissodes terminalis populations in lodgepole pine plantations by annual leader clipping over a five year period. The experiment has been conducted for three years, and in the following table the results to date are summarized.

Area	Leaders Attacked (%)			Clipping Cost ($) per hectare		
	1982	1983	1984	1982	1983	1984
Untreated	4.7	2.0	1.16	-	-	-
Treated	2.8	2.1	0.6	4.51	7.44	4.26

Cariboo Initial Fire Attack Crews were used to do the clipping and the above costs included wages, overhead and transportation. The increased cost in 1983 was because the coverage was increased to include the naturals outside the plantation because they were large enough to be attacked. The experiment will be conducted for another two years.

- D. Doidge and E. Wilford, Cariboo Forest Region, Williams Lake

Control Trials for Root Collar Weevil. Control trials for a root collar weevil, Steremnius carinatus, using two methods of application of pine oil repellent, and screefing as reported in PMP Vol. 3, No. 1, will be surveyed in November for damage. Results after the first year will be reported in the next issue of PMP.

Preliminary inspections of the research plots by Western Forest Products personnel indicated that some seedlings were injured by the pine oil applications.

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

FOREST PATHOLOGY

Quadra TSA Yield Analysis - Impact of Root Diseases. After much prior discussion, representatives from Planning, Protection and Research Branches, as well as from the Vancouver Region, met on 3 October to decide how to best handle root disease losses in Douglas-fir stands in the forthcoming Quadra Timber Supply Area (TSA) yield analysis.

In existing managed stands and in all stands established in future, volume-over-age curves (VACs) and yield tables will be reduced for root disease losses. In current unmanaged stands, unreduced VACs will be used as they were presumed to include root disease losses.

Results from the Vancouver Region root disease survey will be used directly to make the appropriate reductions. Reductions will only be made to the end of the first rotation. It was decided, for purposes of the Quadra TSA analysis, to ignore losses in subsequent rotations from the expansion of root disease pockets.

Future yield analysis for other TSA's may or may not use the above format. Alternative approaches are being explored.

- P. Wood, Vancouver Forest Region, Burnaby

Larch needle cast (Meria laricis) on Douglas-fir. A new needle cast disease was found on Douglas-fir in the spring, 1984 at Koksilah Seed Orchard at Duncan, B.C. A survey of Koksilah Seed Orchard on May 15, 1984 indicated that approximately 14% of the trees were infected.

Dr. A. Funk and T.A.D. Woods of the Canadian Forestry Service, Pacific Forest Research Centre, identified the causal fungus as Meria laricis. Previously, this disease was known only on larch (Larix sp.) where it caused needle discoloration and casting. Since the Koksilah survey, the disease also was confirmed in three other orchards on the coast.

A small trial is in progress to test benomyl and manzate fungicides for control of the disease.

- D. Summers, Silviculture Branch, Victoria

Surveys of Rhabdocline and Swiss Needle Casts. Needle cast surveys were carried out at Snowdon Seed Orchard, Campbell River and at Saanich Seed Orchard, Saanichton, in April, 1984. Virtually all trees, 80% or more, in the orchards showed signs of Swiss needle cast infection on 1983 and older needles. Rhabdocline needle cast was found on 11% (268) of the trees at Saanich and on 3% (29) of the trees at Snowdon. The highest incidence of disease in Saanich Seed Orchard appeared to be on tree families from the Boston Bar and Lillooet areas.

Control measures have been instituted for these diseases, especially Rhabdocline, at Saanich Seed Orchard and a follow-up survey is planned for the spring of 1985.

- D. Summers and G. Morrow, Silviculture Branch, Victoria

Final Report on Use of Dead Lodgepole Pine to Prevent Dwarf Mistletoe Spread from an Infected Cutblock Edge. To prevent lodgepole pine dwarf mistletoe infection, cut borders are usually set at natural guards, for example, roads or infection-free stands. However, some clearcut area limitations preclude this practice. Control measures for infected clearcut borders include leave strips or planting resistant species. Vyse and Suttie noted that planting of a resistant species was ineffective because of natural regeneration of susceptible lodgepole pine in the resistant species strip. An alternative method tested was a strip of dead trees (bordering the clearcut) killed by herbicides to intercept dwarf mistletoe seeds from the infected stand.

There were two objectives for the experiment (E.P. 910.01). First, to assess the efficacy of a strip of dead lodgepole pine to intercept dwarf mistletoe seeds (and produce a seed-free zone) destined for cutblock regeneration and to find the most effective strip width. Second, to determine if the functional lifespan of a strip would allow development of infection-free regeneration on the cutblock.

Four stands of dwarf mistletoe-infected lodgepole pine were selected adjacent to clearcuts. The infested stands were uniform in age, density, height, apparent infection intensity and had a straight edge. To test if the border was infested evenly, traps were placed in the stand to measure seed through-fall.

Conclusions of the project were that the use of dead pine for a dwarf mistletoe seed barrier was impractical; dwarf mistletoe seed flight from an infected border was at least 12 metres.

Further details and a complete final report are available on request.

- E. Wilford and D. Doidge, Cariboo Forest Region, Williams Lake

Forest Protection Branch Pathology Activities. Recent activities and projects undertaken included several field inspections and workshops. In Prince Rupert Forest Region near Smithers, a possible risk to newly planted seedlings from butt and root rot in windthrown spruce and pine was evaluated. Inspections were made near Clearwater to evaluate scheduled cutting areas where de-stumping treatments for root diseases in lodgepole pine and Douglas-fir were proposed. A proposed site for de-stumping near Golden was inspected and a species trial is being planned for 1985. A seminar and field trip on root diseases were conducted with Crown Forest Ltd. staff and Selkirk College forest technology students at Courtenay.

Guidelines on root diseases and dwarf mistletoes were revised, and further minor changes are planned as a result of recent workshops and meetings.

Further work is planned to prepare slide tapes on dwarf mistletoes and root diseases, a poster display on root disease management, a pest booklet on forest pathology and forest management, and publication of the hemlock dwarf mistletoe 1983 workshop proceedings.

- J. Muir, Protection Branch, Victoria

Herbicide Treatment of Indian Paint Brush to Control Lodgepole Pine Stem Rust. Tests in 1982 and 1983 in the tree improvement plantations at Red Rock, south of Prince George, showed that 2,4-D will control Indian paint brush (Castilleja sp.), the alternate host of stalactiform stem rust of pine. Plots treated in the spring of 1982 were still virtually free of the herb in July 1984 indicating that at least three years control is possible from one application of herbicide.

In 1984, lodgepole pine provenance plantations at Red Rock were treated operationally to control Indian paint brush and plots were established to monitor stem rust infections over the next few years. Information collected

from these plots should indicate the efficacy of removing the alternate host for control of stem rust in these seed orchards and plantations.

- D. Summers, Silviculture Branch, Victoria

Salmon Arm Root Rot Project. During 1982, extensive areas of Armillaria mellea and minor amounts of Phellinus weirii were identified on slopes above White Lake and Shuswap Lake covering an area approximately 2 km by 6 km.

A harvesting plan for the most seriously infected areas was begun during 1983-84. Planning has been a slow process due to public concerns in the area. Aesthetics, slash disposal, restocking alternatives, site treatment, landscape management, and harvesting methods all have to be addressed.

Upon completion, the plan will be presented at a local public meeting and if found acceptable, it will be implemented.

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

Mistletoe Eradication. Mistletoe eradication has been carried out on approximately 1 422 hectares of recent cutblocks containing infested residual lodgepole pine. The work was carried out under the auspices of the "Canada Works" employment program and sponsored by Crestbrook Forest Industries Ltd.

- S. Byford, Cranbrook Forest District, Cranbrook

Guidelines. A draft copy of Armillaria root disease management guidelines for the Nelson Region has been circulated to the districts and Branch for comments. The final copy should be finished early in 1985.

- E. Morris, Nelson Forest Region, Nelson

De-stumping. Three operational trials to remove stumps have been completed in the Golden District. Site impact and tree growth studies are being carried out by the Canadian Forestry Service at the Marl Creek site. Planting trials are planned for the Copper Creek site to determine effectiveness of stumping and tree species susceptibility. Both seedlings and shelter cones will be used on the stumped and untreated area.

- E. Morris, Nelson Forest Region, Nelson

Environment 2000 Root Disease Survey. An Armillaria root disease survey in the Golden District was sponsored by Evans Forest Products under the Environment 2000 Federal Works Program. The purpose of the survey was to

determine areas where root disease is occurring and the impact on second growth Douglas-fir stands. The data obtained from these surveys will be used as an overview of the root disease problem and to identify areas where more detailed surveys should be carried out.

- E. Morris, Nelson Forest Region, Nelson

Analysis of Vancouver Region Root Disease Survey Results. Results from the Vancouver Region root disease survey, conducted in 1982 and 1983 (ref: PMP 2:2, p. 23) are presently undergoing further analyses. Site index and quality variables were translated from Forest Service site indices to the newly adopted Bruces' site indices for coastal Douglas-fir. These results will be applicable to the TSA yield analysis which utilizes Bruces' site indices (reference age 100 years, total height over total age) for natural and managed coastal fir forests.

The adoption of Bruces' site indices in B.C. should enhance communication on disease-site relationships with U.S. colleagues.

- J. Beale, Vancouver Forest Region, Burnaby

Root Disease Treatment in Duncan. A small 2.5 ha block of recently logged Douglas-fir is scheduled for stump removal this fall. The project area is heavily infected with Phellinus weirii and is situated on a north aspect, 25-35% slope. A medium size excavator with a bucket is proposed for the project. Time-motion and efficacy studies will be run in 5 plots within the treatment block, to be followed up with normal procedures to study survival.

- J. Beale, Vancouver Forest Region, Burnaby

White Pine Blister Rust. In cooperation with Westar Timber Ltd., regional pest management staff established assessment plots in Westar's spacing and pruning trials to monitor control of white pine blister rust (Cronartium ribicola).

At the Halfway River location, treatments were to prune, prune and space, space, and no treatment. Results will be assessed by reexamination of 24 plots each 0.025 ha, and 12 plots each 0.125 ha.

Spacing and pruning were completed by an Employment Bridging Assistance Program (EBAP) under the supervision of Mark Mack, Westar Silviculture Forester. Spacing resulted in approximately 375 white pine stems per ha without stem cankers. Pruning crews then removed either all branches within 2.5 m of ground level or 50% of the live crown whichever was less.

Within the sample plots, all white pine stems were numbered and each canker was recorded by location.

Details are available from the Nelson Region pest management office.

- D. Gray, Nelson Forest Region, Nelson

White Pine Pruning in Spacing Contracts. Two spacing contracts of 35 and 12 hectares in the Arrow District will include white pine pruning for blister rust control as part of the contract. The pruning is expected to add 25 percent to the cost. The contract clauses read as follows:

A. All white pine crop trees shall be pruned, flush to the stem, using hand shears. Branch pruning shall be done from mineral soil up to 50 percent of the total tree height and not over 2.5 metres.

B. All white pine trees with blister rust on the main stem or having branch cankers within 0.3 meters of the main stem must be felled, except where an opening would be created, then trees with branch cankers within 0.3 meters of the main stem shall be left.

- E. Morris, Nelson Forest Region, Nelson

White Pine Pruning for Control of blister rust in the Nimpkish River Valley. A 76 ha block of predominantly young white pine is being pruned to a height of 2.5 metres, or to 75 percent of the tree height in an attempt to stave off infection. Control blocks have been established and a report on the success of the project will be forthcoming.

- S. Gripich, Port McNeill Forest District, Port McNeill

VEGETATION MANAGEMENT

Ministry Submissions to the Expert Committee on Weeds (ECW) 1984 Research Report. We are pleased to report that several Ministry researchers have made significant contributions in response to this year's call for the ECW 1984 R & D abstracts. Special thanks are due to Les Herring, Rick Fahlman, John Pollack and Bob van den Driessche. The Ministry's 17 new abstracts will help generate additional recognition for the Western Silviculture Section within ECW and thereby help ensure that this important forum benefits forest and nursery vegetation management in this Province.

The reports cite results of trials with glyphosate, fosamine, hexazinone, 2,4-D, and dalapone, including novel application methods. Contact the authors or the undersigned for additional details on this important work.

- H. Benskin, Research Branch, Victoria

Postponement of Aerial Applications of Herbicide in Prince George Forest Region. All aerial applications of herbicide in the Prince George Forest Region in 1984 have been postponed until 1985. Five permit approvals for district projects were not received from the Pesticide Control Branch until July 31-August 1, 1984. With the public notification requirement and 15-day appeal period included in the permits, applications could not be attempted until after August 20th. Applications were judged not possible after this date because of the traditionally poor weather and rapid "brown-up" of target brush and weeds.

- B. Williams, Prince George Forest Region, Prince George

RANGE PEST MANAGEMENT

Development of an Enhanced Pest Management Program to Control Knapweed in British Columbia. The productivity and economic value of British Columbia's forested and non-forested range resource are currently threatened by knapweed invasion. Spread of knapweed poses a long term impact on harvest of forage by livestock and wildlife, agriculture and wildlife industries, and communities. An enhanced spray containment and biological control program is required to cope with the threat of this pest.

Current Situation

Under current livestock management regimes, the Crown land area which provides approximately 400 to 450 thousand animal unit months (AUM) is considered to be subject to knapweed infestation. Total production in 1983-84 was 938,000 AUM. At current levels of control, approximately 50 percent of the Crown forage will be lost to knapweed invasion and will ultimately result in ranch bankruptcies. Those ranches that remain will have to reduce herds 50 percent due to the permanent loss of Crown forage.

Because the land area susceptible to knapweed infestation provides nearly half of the AUM utilized by livestock, it would technically be very difficult to substitute forage from adjacent transitional forests to replace the range forage lost from knapweed invasion. In fiscal year 1982-83, approximately 200,000 AUM were utilized by livestock in transitional forests. Forage from transitional forests is harvested mainly in late summer and fall and could not substitute for spring or late fall range lost to advancing knapweed. These transitional forests, including clearcuts, are also susceptible to knapweed invasion.

The area most readily infested by knapweed is spring and fall ranges. Knapweed reduces other plant species by about ninety percent and thus has a major impact upon forage for livestock and wildlife.

Knapweed infestation impedes or prevents reforestation efforts on dry forest sites common throughout the interior of the province. Susceptible sites are

common throughout most of the province and knapweed invasion will also impact forage availability for wildlife herds. Total knapweed invasion in the East Kootenays would virtually eliminate the elk herd.

Spray Containment Program

First, to retard the spread of knapweed, we must maintain an adequate knapweed containment program using herbicide sprays.

In non-treated areas, knapweed infestation spread from approximately 30 000 ha in 1974 to approximately 84 000 ha in 1983.

The logic behind a spray containment program is to treat infestations when they are few in number and small. This type of treatment is effective and economical. Areas heavily infested, either in number or density of infestation, in general, cannot be cost effectively treated or rehabilitated. However, evaluation must be made on a site-specific basis. Priority must be maintained on containment rather than rehabilitation.

In containment areas in fiscal year 1982/83, the spread of knapweed was considered to be contained on Crown range in the East Kootenay and Cariboo Forest Regions, but effectiveness in the Kamloops Region was uncertain. Through maintaining this spray containment program at fiscal 1982/83 containment levels, approximately 50,000 AUM in the Nelson Forest Region and Kamloops Forest Regions and 200,000 AUM in the Cariboo Forest Region should be protected from further spread of knapweed.

This containment level should also protect infestable rangelands in Prince Rupert and Prince George Forest Regions. In these regions, knapweed infestations are located principally alongside highways and railways. If these infestations spread to Crown land from the existing or other seed sources, then increased knapweed control programs will be required. There is some knapweed in the Vancouver Forest Region but the extent of the infestation is not known.

Biological Control Program

Increased funding will allow the reinstatement and increase of the fiscal 1984/85 biological control program.

A successful knapweed treatment/control program consists of temporary herbicide spray treatment and further development and implementation of known effective biological control agents, which should ultimately largely substitute for herbicide spraying. Biological control agents such as flies, beetles and other insects affect knapweed seed production, root growth and leaf development. These natural biological control agents were absent when this exotic weed was originally introduced to Canada.

To date, six biological control agents, insects, have been introduced from Europe. Of these, two insects, Urophora spp. and Sphenoptera jugoslavica, now exist throughout most of the province and frequently have reduced knapweed seed production by about ninety percent, e.g. from 34,000 to 1,300 seeds per m^2. Agapeta Zoegana and Pellochrista medullana larvae reduced vigor of knapweed plants of the rosette growth shape and killed some individuals. However, their distribution is not yet adequate to have a substantial impact. These insects probably have reduced the cost for the spray containment program and reduced the rate of spread of knapweed. However, the remaining knapweed seed production is still very high and other biological control agents are required.

Various biological control agents exist through knapweed infested areas in Europe and Russia but are frequently difficult to find because they effectively control knapweed. A rust exists in Canada (Maritimes) but is considered hazardous to safflower. Continued support of Agriculture Canada biological control experts and international biological control experts through the Commonwealth Institute of Biological Control (C.I.B.C.) is required. Other biological control agents, such as beetles, will require rearing facilities (cages) to increase the rate of reproduction and acclimatization to various sites which have different climatic, topographic, vegetation and other characteristics.

An increased biological control program is supported by other public and private agencies such as the B.C. Cattlemen's Association, B.C. Ministry of Agriculture and Food, Agriculture Canada research stations and biological control staff and the University of British Columbia. Agriculture Canada will continue to establish and study biological control agents at the Summerland Research Station, and is considering acquiring a scientist to work on knapweed at a research station. University of British Columbia staff will provide expert assistance under contract in fiscal 1985/86 so that biological control agents may be properly identified, captured and released at operational field sites. In 1985, in conjunction with the B.C. Ministry of Agriculture and Food, the B.C. Ministry of Forests will assist in introducing two additional insects.

Recent developments and plans

Our overall strategy is to maintain an adequate containment spray program until biological control of knapweed can be achieved. Since there have been serious funding and manpower shortages since fiscal year 1982/83, the following actions were undertaken.

Under the auspices of the Resource Analysis, a small Ministry of Forests working group was established. The achievements of this group included: a computerized system of weed spray records which will be implemented province-wide by the Ministry of Forests in 1985/86; completion of spray records to date and a compilation of data on areas sprayed and infested in cooperation with Agriculture Canada, Economics Branch and the Knapweed Action Committee; and development of a paper to explain the current knapweed situation.

A contract was awarded to prepare a problem analysis of the knapweed problem, including a strategy to develop and implement a knapweed control program. Important areas identified for consideration in the contract include: funding, human resources, knapweed site classification, spray containment program, introduction of biological control agents, biological control operational program, knapweed and plant community modelling, knapweed evaluation, and institutional organization. The report also is to recommend adequate budgets, work force, planning, management, research and operational strategies to effect a knapweed control program. A copy of the research contract proposal is available from the Range Management Branch. Currently we are negotiating with Research and Protection Branches for research and entomological expertise to assist in the project.

A funding proposal for $551,000 was submitted for an enhanced spray containment and biological control program. Some $351,000 would be used for spray containment to provide for the same level of containment as was achieved in fiscal year 1982/83 with the exception of Kamloops Region where a lesser level of containment may be achieved. The remaining funds would be used to maintain the biological control program in 1984/85 plus an increase to include: introduction of extra agents, provision of rearing facilities (cages) for some biological control agents during establishment and during initial operational field distribution, improvement of evaluation (monitoring and research) of chemical, biological and cultural treatment, and other inputs required for a successful biological control program.

Knapweed will be controlled when biological control agents, possibly assisted by some chemical spraying in "problem" areas, have stopped the spread of knapweed and resulted in a low occurrence of knapweed in infested areas. Currently implemented (fiscal 1984/85) and budgeted programs (fiscal 1985/86) provide for an adequate knapweed containment program only in the Cariboo Forest Region.

If the spray containment program outlined here is not implemented, then the infestable range area likely will be infested within 20 years and lost from production entirely within 30 years. If the spray containment program is maintained but the biological control is not, then the areas which could be "protected" by the spray program will gradually be reduced and may become entirely infested in the long run.

Biological control of knapweed coupled with herbicide treatment should contain knapweed infestation of forested and non-forested rangelands in Cariboo, Nicola Valley, Thomson, East Kootenay and north central B.C. and prevent further large areas of infestation that are now found in the Okanagan, Boundary and other districts.

- E. Jensen, Range Management Branch, Victoria, and Regional Staff

Control of Weeds in the Cariboo. In the Cariboo Region in 1984, 315 L of Tordon 22-K were used to treat 207 weed infestations, mostly knapweed. A

total of 108 hectares were sprayed throughout the region with 82 ha sprayed in the 100 Mile House Forest District near Clinton.

Considerably more acreage was treated in 1984 by the weed crew than in previous years. This was a result of good spraying conditions encountered as well as increased public awareness and identification of noxious weeds. Several new infestations were discovered on both public and private land.

The problem of private landowners not cleaning up weed seed sources still exists, and until the Weed Act is enforced by those agencies with the legislation to do so, the problem will undoubtedly continue.

Some nodding thistle was sprayed in the Alexis Creek Forest District at Deer Creek. This weed will be closely monitored in the future, because new infestations are noted annually. It is of concern in western U.S.A.

Public awareness programs to control noxious weeds will continue to receive top priority by all range staff.

- L. Johnsen, Cariboo Forest Region, Willliams Lake

PESTICIDES

Practical Training Sessions in Cariboo Region. To promote better understanding of pesticide use and application, one-day practical demonstrations of spray equipment were conducted in forest districts. Demonstrations were supervised by George Leroux, Range Section, and were conducted on-site using Tordon herbicide.

Topics covered in the demonstration included spray designs, sprayer calibration, mixing, application and safety. Equipment included a backpack sprayer, boomless nozzle and handgun sprayers. The Regional Pesticide Use Committee attended this demonstration and used the various spray equipment. I recommend this type of training.

- D. Doidge, Cariboo Forest Region, Williams Lake

Potable Water and Herbicide Residues. In a few areas of the province, there is an increasing problem with use of herbicides adjacent to watersheds. This situation inevitably causes a very emotional reaction by residents of the local community. The only way of resolving a conflict over herbicide use and water quality is through direct and reasoned discussion. Such discussions will commonly be of a socio-political nature.

Technical information on the significance of herbicide residues and potable water quality regulations is available from Protection Branch, Victoria. Such

information should not be expected to resolve a problem but should help create a foundation for productive discussion.

- J. Henigman, Protection Branch, Victoria

Update on the Production of the Forest Pesticide Handbook of B.C. The Forest Pesticide Handbook of British Columbia is designed to provide detailed information and working guidelines to operational foresters in the province. This handbook may also be of interest to other audiences such as pesticide regulatory agencies, public interest groups, and forestry agencies outside the province, but it must be clearly understood that the handbook does not represent policy or regulation of any kind.

The seven-volume handbook, published by the Ministry and the Council of Forest Industries (COFI) of B.C., is a major rewrite and expansion of the original, issued by COFI in 1975. It is intended that this handbook will be periodically updated to meet the ever-changing technology of pesticide use in reforestation, and insect and disease control.

This handbook consists of the following volumes:

Volume 1	How to Handle a Forest Project Involving Pesticides	(final draft)
Volume 2	Pesticides Used in B.C. Forests	(3rd draft)
Volume 3	Pesticide Application Techniques	(3rd draft)
Volume 4	Equipment Used in Pesticide Applications	(1st draft)
Volume 5	Administrative Aspects of Forest Pesticide Use	(1st draft)
Volume 6	Pesticide Label Catalogue	(3rd draft)
Volume 7	Legislation Concerning Pesticides	(3rd draft)

All volumes of the handbook should be available for sale from COFI prior to the start of the 1985 field season. Any questions concerning the handbook should be directed to the undersigned.

- J. Henigman, Protection Branch, Victoria

Assessment of the Enzo Brush Saw for Use in Forestry. Provincial and federal agency staff representing most of the pesticide regulatory agencies including Health, Workers' Compensation Board, Environmental Protection Service, Fish and Wildlife, and Pesticide Control Branch agreed that the Enzo brush saw herbicide applicator is acceptable for use in B.C. forestry. Applicator herbicide exposure and off-target drift were investigated and found not to pose any hazard as long as the saw operators are adequately trained.

Pesticide use permits for use of the saw can now be processed without significant problem. Some data on dosage rates and timing of cutting are still required by forestry. Any questions concerning the Enzo brush saw should be directed to the undersigned.

- J. Henigman, Protection Branch, Victoria

Forest Pesticide Applicator Courses. Certified applicator courses which include hands-on demonstrations of equipment and techniques, will be given throughout the province in 1985. The courses will be taught by instructors from Protection and Silviculture Branches, Fish and Wildlife Branches, Workers' Compensation Board, and Pesticide Control Branch.

Applicants should contact either the Regional Ministry office, Protection or Silviculture, or the local college continuing education section. A course fee of $60-$90 will be charged by the local college. An additional $10 examination fee is also assessed by the Pesticide Control Branch

The following forest applicator courses in 1985 are currently planned:

Nanaimo:	January 14-18
Burnaby:	February 18-22
Williams Lake:	March 18-22
Kamloops:	March 25-29
Castlegar:	April 8-12
Prince George:	April 22-26
Prince George:	April 29-May 3
Smithers:	May 6-10

Additional forest applicator courses and forest nursery applicator courses may be scheduled at a later date depending on requests from applicators.

- J. Henigman, Protection Branch, Victoria

Forest Pesticide Applicator Course at Prince George. A forest pesticide applicator course is scheduled for April 22-26, 1985 at the College of New Caledonia, Prince George. The course is open to personnel of the B.C. Forest Service, forest licensees and private contractors. Interested applicants should contact Bob Watters at the College of New Caledonia (562-2131).

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

Prince George Regional Forest Pesticide Review Committee. The Prince George Forest Region now has a regional Forest Pesticide Review Committee as outlined in its new standard operating procedure (7-5) dated September 18, 1984. All pesticide applications originating from Forest Service district offices in the region must be routed through this committee. Any forest licensees wishing to apply pesticides to Crown land under agreement with Section 88 of the Forest Act, must also route their permits through the regional committee.

- K. Belik, Prince George Forest Region, Prince George

B.C. Pesticide Report, 1983. An internal report on the use of pesticides in 1983 in B.C. forestry will be published soon. Graphs from this report showing forest areas treated by pesticide and forest areas treated for control purposes are presented in the Tabulations and Graphics Section of this issue of PMP.

Other information contained in the 1983 report will include: research projects; application methods used; types of forest areas treated with pesticides; comparison of areas scheduled for pesticide treatments in 1983 and areas actually treated; and reasons for project cancellations.

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

Forest Pesticide Certification Courses. Two forest pesticide certification courses were held at Smithers during 1984. The first course on June 18-22 was conducted by Ministry of Forests in cooperation with the Pesticide Control Branch. This course was given to 31 persons.

A second course was held October 22-26 with 21 students attending. This course was given at the Northwest Community College with Ministry of Forests and Pesticide Control Branch employees as instructors. College facilities and registration will be used for future courses.

Another course planned for early May probably will be well attended due to increased use of herbicides, particularly brown and burn projects expected in 1985.

- V. Barge, Prince Rupert Forest Region, Smithers

Regional Pesticide Storage Area Increased. The pesticide storage area at Telkwa is being increased by an additional 480 square feet. This addition combined with the existing storage area will give a total storage of 680 square feet.

The addition is being built to allow easy loading and unloading of bulk loads of pesticide and will feature approved storage racks and heating.

- V. Barge, Prince Rupert Forest Region, Smithers

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

Protection Branch

R.F. (Bob) DeBoo, Manager, Pest Management, Victoria, 387-5965
P.M. (Peter) Hall, Forest Entomologist, Victoria, 387-5965

J.F. (John) Henigman, Pesticide Specialist, Victoria, 387-5965
J.A. (John) Muir, Forest Pathologist, Victoria, 387-5965
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 Waste Coordinator, Victoria, 387-6729
L.E. (Lloyd) Wilson, Decay and Waste Coordinator, Victoria, 387-6729

Cariboo Forest Region

D.F. (Don) Doidge, Regional Pest Management Coordinator, Williams Lake, 398-7121
R.E. (Bob) Merta, Regional Pest Management Assistant, Williams Lake, 398-7121
R.M. (Ralph) Kossin, District Pest Management Coordinator, Quesnel, 992-2147
J.R. (John) Bradley, District Pest Management Coordinator, Williams Lake, 398-7121
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, 492-8721
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 Research Coordinator, Burnaby, 299-9151
D. (Dave) Hames, Protection Resource Officer, Chilliwack, 794-3361

L. (Lance) Mitchell, Protection Resource Assistant, Squamish, 898-9671
B. (Barry) Miller, Protection Resource Officer, Powell River, 485-9831
R. (Ron) Diprose, Protection Resource Assistant, Powell River, 485-9831
C. (Carol) Price, Protection Resource Assistant, Duncan, 746-5123
D. (Dan) Powell, Protection Resource Officer, Port Alberni, 724-5786
S. (Steven) Schmidt, Protection Resource Officer, Campbell River, 286-3282
D. (Doug) Harris, Protection Resource Assistant, Campbell River, 286-3282
S. (Stan) Gripich, Protection Resource Officer, Port McNeill, 956-4416
D. (Dennis) Tippie, Protection Resource Officer, Mid-Coast, 982-2621

MEETINGS

Western International Forest Disease Work Conference, Taos, New Mexico, September 24-28, 1984. More than 80 forest pathologists in research, teaching, extension and government service met at the 32nd annual session. On a panel examining forest pest losses, J. Muir outlined forest pest impacts and management in B.C. emphasizing recent work by J. Reed and D. Errico to incorporate fire and pest losses into models used to analyze timber supplies.

Ministry pathology activities were also reported to the conference and specific projects to the disease control and dwarf mistletoe committees. The pest management display board was exhibited and copies of recent publications were provided. Future meetings are scheduled at Olympia, Washington for September 23-27, 1984, Juneau, Alaska in 1985 and possibly in B.C. in 1986.

- J. Muir, Protection Branch, Victoria

Invermere Disease Management Workshops. A three-day field workshop was held at Invermere to examine and discuss detection, surveys and control options for lodgepole pine dwarf mistletoe and *Armillaria* root disease. Pre-harvest inspections and more intensive surveys of root-disease-infested areas were recognized as essential for prescribing effective, economic treatments.

G. Richardson, Crestbrook Forest Industries, showed several management treatments for lodgepole pine mistletoe control applied by Revelstoke Sawmills Ltd. near Radium, including falling and destruction of pine residuals, falling of infected pines along cutblock boundaries, and planting fringe areas with Douglas-fir to prevent reinvasion by dwarf mistletoe.

In some areas, where management was complicated by the occurrence of both root disease and mistletoe, a mixture of pine and fir was preferable. Although future use of western red cedar was uncertain, on one site this tree species regenerating in *Armillaria* infection centers seemed more desirable because it was more resistant to root disease than other planted tree species and was growing well since logging.

- J. Muir, Protection Branch, Victoria, E. Morris, Nelson Forest Region, Nelson, and E. Begin, Invermere Forest District, Invermere

Root Disease Modelling Workshop, November 1984. A workshop to develop a stand model to assess root disease and effects of various treatments is scheduled November 7-9, 1984, with follow-up sessions to be scheduled at a later date. The objective is to develop a stand model that will be suitable for use with other currently available tree growth models such as RMYIELD, DFSIM and PROGNOSIS.

The root disease model is intended to enable managers to evaluate effects of various levels of disease, silvicultural treatments and stand conditions on spread and control of root diseases including Armillaria and Phellinus root diseases.

- J. Muir, Protection Branch, Victoria

Golden TSA Committee examines Armillaria. A series of meetings dealt with impact, survey methods and control of Armillaria root disease of Douglas-fir in the Timber Supply Area (TSA), including a 1 1/2 day session October 10-11, 1984, to examine representative sites.

Dr. Duncan Morrison, Research Scientist, and A. Johnson, technician, from the Canadian Forestry Service, Pacific Forest Research Centre, resolved several questions including symptoms and signs of disease for surveys, spread rates, rate of tree killing, and control options such as more "resistant" (less susceptible) tree species and de-stumping.

Further work was proposed, including re-analysis of root disease survey data from an Environment 2000 project sponsored by Evans Forest Products Ltd. and possible further sampling to define root disease losses in adjacent districts and other regions.

- J. Muir, Protection Branch, Victoria, E. Morris, Nelson Forest Region, Nelson, and L. Price, Golden Forest District, Golden

Task Force on Pest Impacts. A task force of G.A. Van Sickle and G. Miller, Canadian Forestry Service, Pacific Forest Research Centre, and J. Muir and T. Niemann, Ministry of Forests, was organized by the Joint CFS-MOF Research Committee. Their objective is to outline criteria which can be used to judge the importance of a pest for research purposes, and to develop and apply a procedure to Polyporus tomentosus root disease of spruce as an example.

Several meetings have resulted in a checklist of information, an assembly of data and a preliminary estimate of P. tomentosus losses in the Prince George Timber Supply Area. A final report to the joint research committee should be made in December 1984.

- J. Muir, Protection Branch, and T. Niemann, Strategic Studies Branch, Victoria

Pissodes strobi Task Force. A small task force was established to review current and future research needs in relation to P. strobi. This group will advise on perceived priority areas and attempt to coordinate research for maximum benefit. Long-term operational approaches will also be addressed for both coastal and interior situations.

- P. Hall, Protection Branch, Victoria

Interagency Committee on Mountain Pine Beetle. This committee, comprised of representatives from the B.C. Ministry of Forests, Alberta Forest Service, Canadian Forestry Service, Parks Canada and B.C. Ministry of Lands, Parks and Housing, examined beetle management opportunities and programs in the B.C./Alberta border area. Funding for related projects in B.C. will be derived from the expanded bark beetle program and will be directed to beetle related activities in priority areas.

- P. Hall, Protection Branch, Victoria

Ad hoc Committee on Forest Pesticides. On 24 October 1984, the Committee hosted a panel discussion on the use of herbicides in forestry at the Media Centre in Vancouver. Panelists included Prof. Ted Sterling of Simon Fraser University, John Henigman of the Ministry of Forests, Dr. John Manville of the Canadian Forestry Service, and Dr. John Sehmer representing the B.C. Medical Association. Clay Perry of the International Woodworkers of America moderated the discussion on "communication gaps and perceptions of risk in the use of herbicides in forest management." More than 100 invited guests attended this important and lively event. The speakers' contributions produced good follow-up interchange and dialogue with the audience.

The Professional Pest Management Association of B.C. will have unedited videotapes available, and a summary package, including Dr. Terry Simmons' overview remarks, is available from the undersigned upon request.

- R. DeBoo, Protection Branch, Victoria

Integrated Vegetation Management Association. Another meeting concentrating on the concern for commercial pesticide use was sponsored by the IVMA at the Delta Airport Inn, Richmond, on 22 November 1984. Theme for the meeting was "Public Issues in Vegetation Management," and speakers were Jack Freeman, Agriculture Canada Scientist, Agassiz Research Station, H. Patzelt, Director of Environmental Services, Peace River-Liard Regional District, and J.O. Boateng and John Henigman of the Ministry of Forests.

- R. DeBoo, Protection Branch, Victoria

Bark Beetles and Oil Exploration. The Canadian Petroleum Association held its fall meeting in Cranbrook on October 9th and 10th. Members heard presentations from Forest Service staff on bark beetle problems associated with seismic line construction. Presentations were well received and the workshop-style discussions were very productive.

- S. Byford, Cranbrook Forest District, Cranbrook

Nelson Regional Meetings. Pest management staff participated in Canada-U.S.A. Mountain Pine Beetle Joint Working Group Meeting, October 30-31, and the M.P.B. Interagency Technical Committee Meeting, November 1. Lectures in pest management were presented to University of B.C. forestry class at Blue Lake Camp, August 28-29 and September 6, and to Selkirk Forest Technology Class at Castlegar, October 26.

- E. Morris, Nelson Forest Region, Nelson

Beetle Management in Border Regions. American and Canadian foresters and pest management specialists met at Victoria on 30-31 October 1984 to establish a working committee to facilitate mountain pine beetle and lodgepole pine management in the border region of Alberta, B.C., Montana, Idaho and Washington. The group will concentrate on practical aspects to limit beetle impact and to improve management strategies for growing lodgepole pine. Provincial representation includes Regional Managers from Nelson and Kamloops as official representatives from the Ministry of Forests and Mr. Kerry Joy from the Ministry of Lands, Parks and Housing. Next meeting is in January 1985 at Spokane, Washington.

- R. DeBoo, Protection Branch, Victoria

CCREM Seminar for Deputy Ministers. A comprehensive one-day seminar was held on 15 November 1984 at Ottawa to update provincial and federal forestry officials on the regulation and use of herbicides in forest renewal. Speakers included federal and provincial regulatory officials and representatives from academia, the Canadian Agricultural Chemicals Association and the Canadian Council of Resource and Environment Ministers (CCREM) Task Force on Pesticides in Forest Management. It is anticipated that papers will be published (as proceedings) and made available by CCREM within the next few months.

- R. DeBoo, Protection Branch, Victoria

TABULATIONS AND GRAPHICS

FOREST PEST REVIEW COMMITTEE of BRITISH COLUMBIA

MEMBERSHIP LIST
(December 1984)

NAME	MAILING ADDRESS	REPRESENTING	PHONE NO.
R.W. Robbins (Ralph) (Chairman)	Ministry of Forests 1450 Government Street Victoria, B.C. V8W 3E7	---	387-3901
D. Summers (Don) (Secretary)	Silviculture Branch Ministry of Forests 1450 Government Street Victoria, B.C. V8W 3E7	---	387-1191
N. Alexander (Norm)	B.C.I.T. 3700 Willingdon Avenue Burnaby, B.C. V5G 3H2	B.C. Technical Schools	434-5734
R. Christie (Bob)	Gorman Bros. Lumber Ltd. Westbank, B.C. V0H 2A0	Interior Lumber Manufacturers Association	768-5131
J. Borden (John)	Simon Fraser University Dept. of Biological Sciences Burnaby, B.C. V5A 1S6	B.C. Universities	291-3646
R. DeBoo (Bob)	Protection Branch Ministry of Forests 1450 Government Street Victoria, B.C. V8W 3E7	Ministry of Forests	387-5965
R.E. Flinton (Bob)	Pinette & Therrien Mills Ltd. R.R. #3, Glendale Drive Williams Lake, B.C. V2G 1M3	Cariboo Lumber Manufacturers Association	392-7191
K. Joy (Kerry)	Parks & Outdoor Recreation Division Ministry of Lands, Parks and Housing 205-633 Courtney Street Victoria, B.C. V8W 1B9	Ministry of Lands, Parks and Housing	387-5002

Mailing Address: c/o D. Summers, Secretary

MOF File No: 150-30

NAME	MAILING ADDRESS	REPRESENTING	PHONE NO.
R. Kobylnyk (Ron)*	Pesticide Control Branch Ministry of Environment 810 Blanshard Street Victoria, B.C. V8W 3E1	Ministry of Environment *(Observing Member)	387-4321
L. Kornder (Lee)	Occupational Health Division Ministry of Health 828 West 10th Avenue Vancouver, B.C. V5Z 1L8	Ministry of Health	874-2331
R. Kussat (Rick)	Environmental Protection Service Kapilano 100 Park Royal West Vancouver, B.C. V7T 1A2	Environmental Protection Service	666-6711
F. Leslie (Frank)	Crown Forest Industries Ltd. Coast Wood Products Div. P.O. Box 2000 New Westminster, B.C. V3L 5A4	Council of Forest Industries	521-1941
J. Mclean (John)	U.B.C. Faculty of Forestry 191-2357 Main Mall Vancouver, B.C. V6T 1W5	B.C. Universities	228-3360
R. Morley (Rick)	Fish & Wildlife Branch Ministry of Environment 780 Blanshard Street Victoria, B.C. V8W 2H1	Ministry of Environment	387-1493
B. Nordman (Brian)	Northern Interior Lumber Sector 803-299 Victoria Street Prince George, B.C. V2L 2J5	NILS Council of Forest Industries	564-5136
C. Perry (Clay)	I.W.A. 5th Floor 1285 West Pender Street Vancouver, B.C. V6E 4B2	International Woodworkers of America	683-1117
A. Van Sickle (Allan)	Pacific Forest Research Centre 506 West Burnside Road Victoria, B.C. V8Z 1M5	Canadian Forestry Service	388-3811
P. Warrington (Pat)	Aquatic Studies Branch Ministry of Environment 765 Broughton Street Victoria, B.C. V8W 1E2	Ministry of Environment	387-4441

STATUS OF BARK BEETLE MANAGEMENT PROGRAMS IN THE PRINCE GEORGE FOREST REGION IN 1984

	P. G. West	P. G. East	McBride	Vanderhoof	Ft. St. James	Mackenzie	Dawson Cr.	Ft. St. John	Ft. Nelson	Totals
Area (ha) Infested by Bark Beetles	780	35 000	2 000	1 000	6 000	881	3 895	Some scattered spots. No known infestations.		49 556
Area (ha) Harvested within Bark Beetle Areas	451	10 000	349	0	695	1 488	2 728			15 711
Area (ha) Planned for Harvest within:										
1 Year	402	15 000	270	80	970	796	0			17 518
2 Years	800	10 000	50	200	740	1 102	0			12 892
3 Years	323	8 000	39	250	740	700	0			10 052
Area (ha) "Lost" (Inaccessible or Non-Merch.)	323	10 000	1 687	470	3 500	559	1 167			17 706
Volume (m^3) Infested by Bark Beetles	7 515	6 400 000	1 042 000	230 000	1 902 000	120 286	1 051 520			10 753 321
Volume (m^3) Harvested within Bark Beetle Areas	157 550	5 000 000	119 522	0	220 315	58 875	736 520			6 292 782
Volume (m^3) Planned for Harvest within:										
1 Year	140 700	1 875 000	82 125	18 400	307 490	55 332	0			2 479 047
2 Years	273 000	1 250 000	12 992	46 000	234 580	64 954	0			1 881 526
3 Years	273 000	1 000 000	9 555	57 000	234 580	44 362	0			1 618 497
Volume (m^3) "Lost"	6 000	480 000	353 150	108 000	1 109 500	227 720	100 000			2 384 370
Trap Tree Patches felled in 1983-84 (no. patches, no. per patch, total volume)	47[a]:7-39: 1 960	150[b]:135: 20 000	0	3:4:5	1:100:130	0	40:10:300			241:265:22 395
Trap Tree Patches planned for 1984-85 (no. patches, no. per patch, total volume)	23:13: 310	25:10: 500	4[b]:250: 1 020	10:3:12	0	0	0			62:276:1842

[a] Includes 26 "Decks" and 1 felled Right-of-Way.

[b] Trap Tree "Decks".

Mortality of Black Army Cutworm in Prince George West Forest District in 1984

Location	No. Larvae Reared	No. Moths Successfully Emerged	No. Larvae Killed by Virus[a]	No. Unemerged Pupae Killed by:		
				Ichneumonids	Tachinids	Unknown Causes
CP 134-7	135	9	99	12[b]	13[c]	2
CP 135-2	54	5	26	14[d]	4[e]	5

[a] A subsample of the dead larvae revealed virus infection; it is assumed that all the unemerged larvae succumbed to virus.

[b] 12 pupae containing Ichneumonid pupae

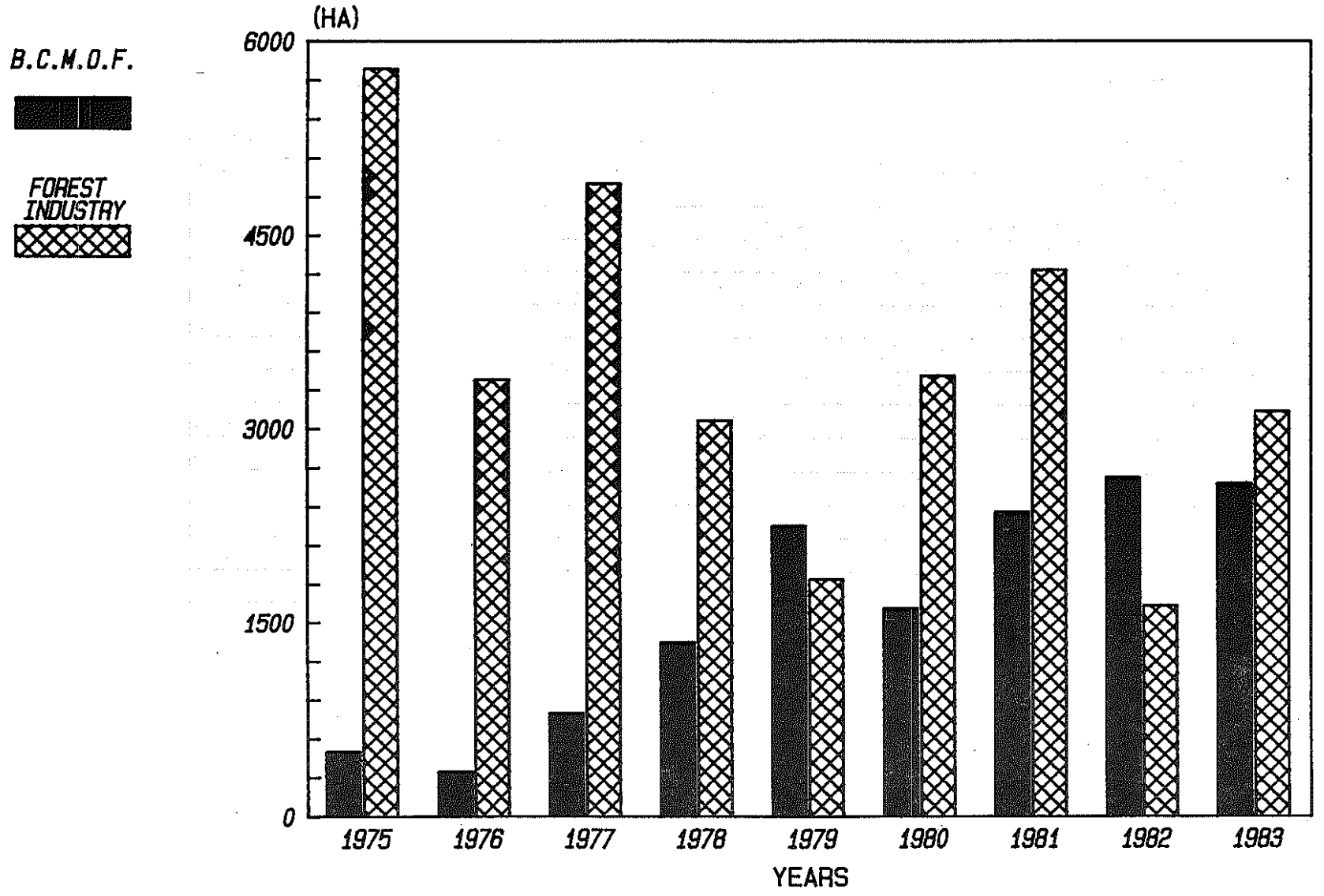
[c] 12 emerged adult Nowicia latigena (Tachinidae)
1 pupae containing Tachinid pupae

[d] 3 emerged adult Eutenyacra suturalis (Ichneumonidae)
11 pupae containing Ichneumonid pupae

[e] 3 pupae containing Tachinid pupae
1 pupa containing Tachinid pupa

TOTAL HECTARES OF LAND TREATED WITH HERBICIDES FOR FORESTRY PURPOSES

1975 - 1983



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

HERBICIDE USE IN B.C. FORESTRY 1956-1984[1]
(Area treated in hectares)

HERBICIDE	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969
AMITROLE														
ATRAZINE														
BROMACIL														
DICAMBA														20
DINOSEB														
FOSAMINE														
GLYPHOSATE														
HEXAZINONE														
M.S.M.A.				2									7	240
PARAQUAT														
PICLORAM												113	134	332
2,4-D	40				623	81	837	181	399	271	134	156	211	463
2,4,5-T	6	54	75	11	53	135	498	690	1277	914	900	2192	1636	1153
Other														

[1] Estimates of use for some years and for some herbicides have been made.

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

HERBICIDE USE IN B.C. FORESTRY 1956-1984[1]
(Area treated in hectares)

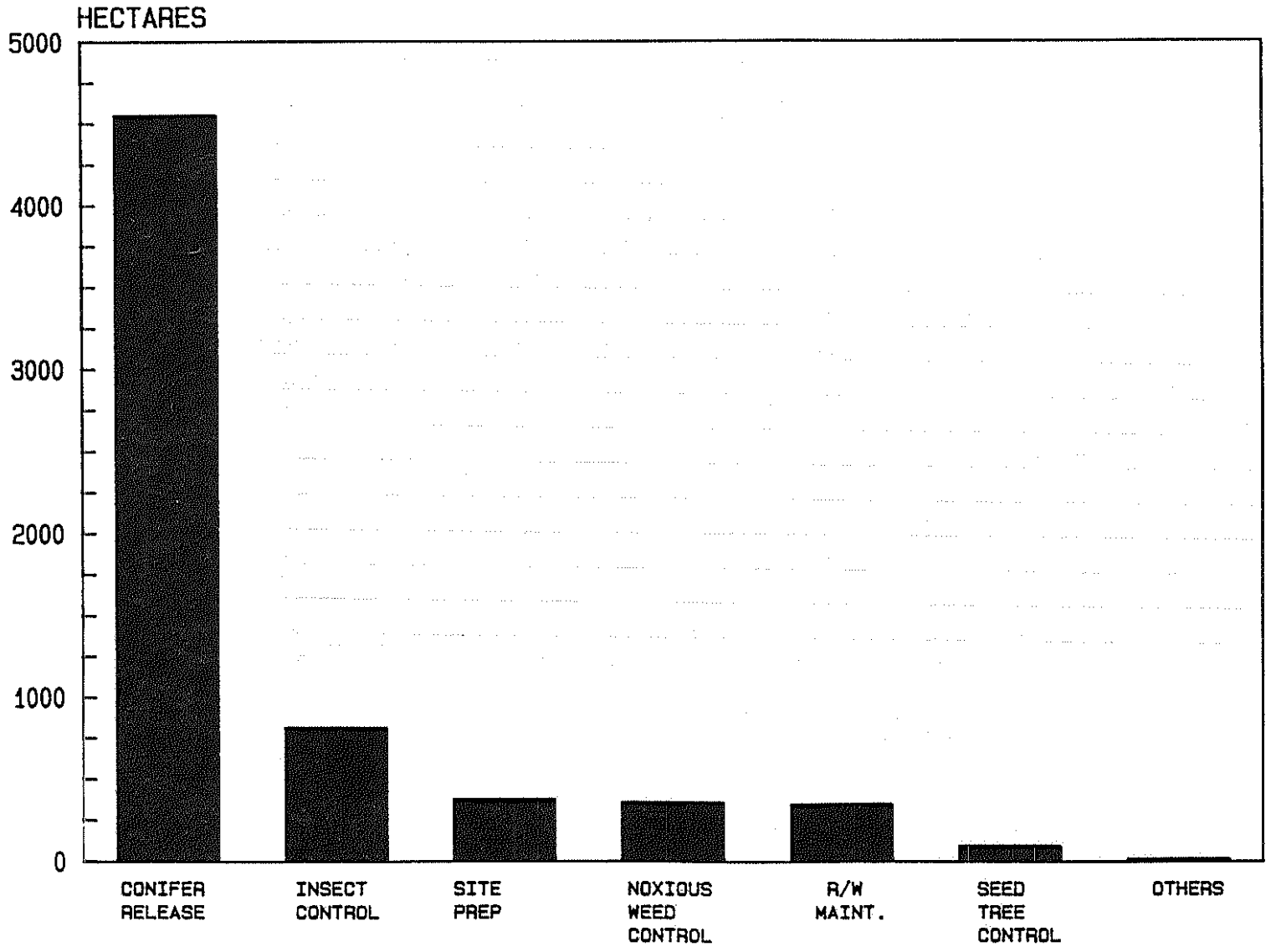
HERBICIDE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984[2]
AMITROLE								12	12				3		
ATRAZINE								4	1			21			
BROMACIL							24			0.4					
DICAMBA															
DINOSEB									35						
FOSAMINE							2	76	159	264	1136	2762	36	41	
GLYPHOSATE								10	80	90	159	76	273	329	
HEXAZINONE								2	17			2	1	9	
M.S.M.A.	942	3516	1663	2089	4557	1390	2162	1290	821	75					
PARAQUAT		122	46	97			8		2						
PICLORAM		357	130	569	1091	954	642	160	147	138	594	352	753	257	
2,4-D	761	622	1204	1790	1155	1464	2563	1889	1622	1584	3014	1812	2802	4992	
2,4,5-T	1153	2227	2592	1449	2799	1830	1214	1491	709	74					
Others												4	226	131	

1 Estimates of use for some years and for some herbicides have been made.
2 Estimated total herbicide use for 1984 is 7050 ha.

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

USES OF PESTICIDES IN FORESTRY[1]

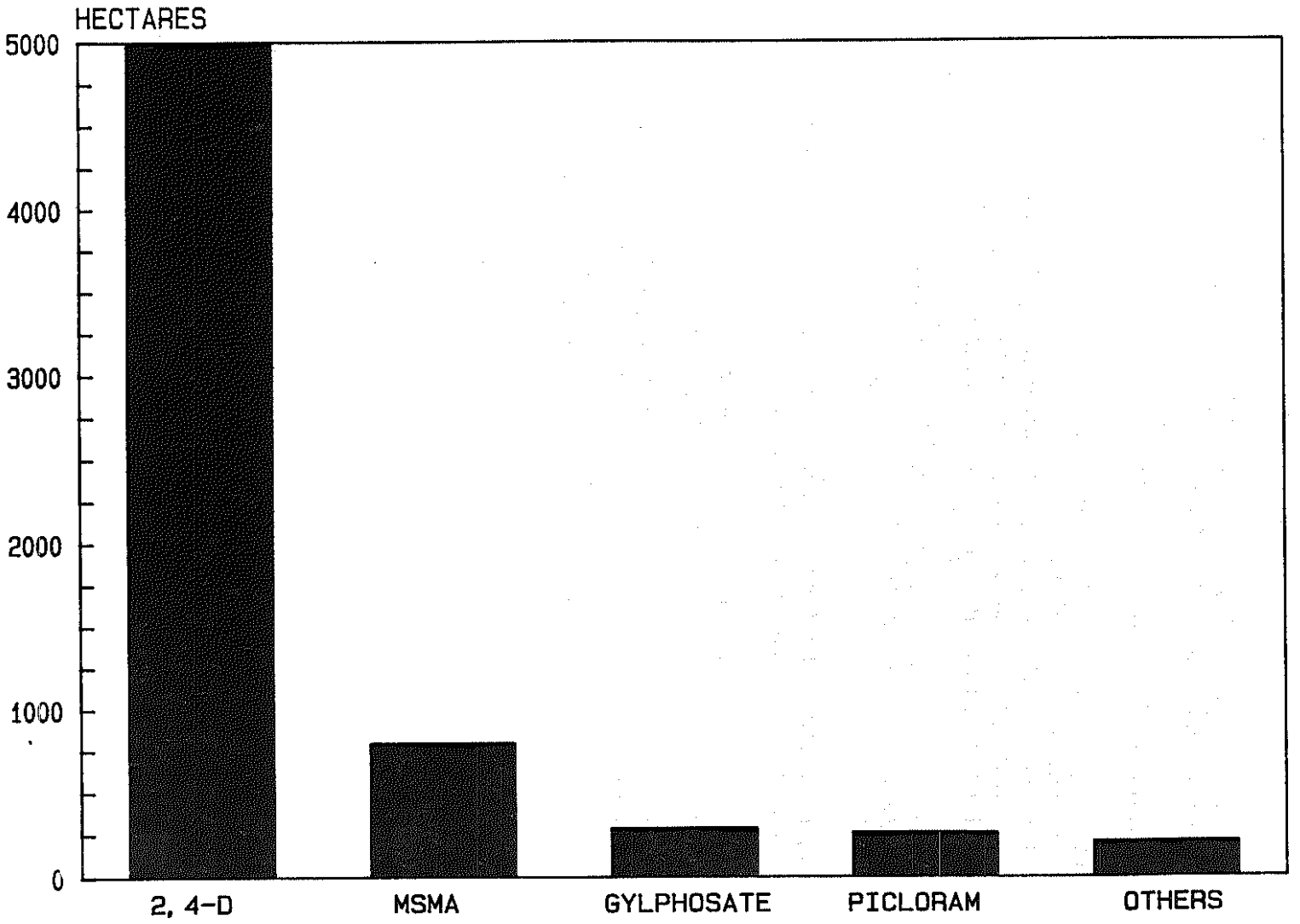
1983



[1] B.C. Ministry of Forests and B.C. Forest Industry combined
Prepared by P. Humphreys, Protection Branch, Victoria

FORESTRY PESTICIDE USE BY AREA TREATED [1]

1983



[1] B.C. Ministry of Forests and B.C. Forest Industry combined
Prepared by P. Humphreys, Protection Branch, Victoria

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