



Province of
British Columbia
Ministry of
Forests

PEST MANAGEMENT PROGRESS

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

Volume XI, Number 1 (File 312-20)

May, 1992

UP WITH FOREST HEALTH!

Recently there has been dramatic and substantial new support for forest health. In Vancouver, an emergency interagency program to eradicate the Asian gypsy moth is well underway. In other areas of the province, more support is being given to the silviculture forest health program to prevent damage from bark beetles and other harmful agents.

Although the controversial spray program in Vancouver was based on limited data, and the chances of successful eradication of the moth were only moderate, it is particularly gratifying to realize the tremendous support from all of our forest service staff; from local, provincial, and federal governments, and politicians; and from many other knowledgeable or expert members of the public.

Agriculture Canada has undertaken the lead role for the Asian gypsy moth program, but a crucial operations role is being undertaken by many other agencies and hard-working forest service staff. They have been a remarkable team. Regardless of the outcome, we are very proud of their efforts, and the support given by our colleagues, staff, and associates.

Another less-spectacular but very significant achievement has been a modest increase in funding for regional and district projects to prevent damage from bark beetles and other agents. This support comes at a time of financial cutbacks and uncertainties, and is generated by the move of the forest health program from Fire Suppression to Silviculture Branch.

Silviculture staff in the forest regions presented strong arguments for increased forest health funding. Although all requests could not be met for 1992-93, we are optimistic that future budget proposals will receive more support. Several initiatives are underway to support these efforts, including a strategic plan for forest health that is being assembled from each forest region's plan, to show the benefits of an expanded forest health program.

- J. Muir, Silviculture Branch, Victoria.

CONTENTS

<u>SUBJECT</u>	<u>PAGE NO.</u>	<u>SUBJECT</u>	<u>PAGE NO.</u>
1. Forest Health - General	3	6. Personnel	33
2. Forest Entomology	14	7. Meetings	38
3. Forest Pathology	24	8. Tabulations & Graphics	39
4. Mammal Damage	28	9. Publications and Reports	44
5. Pesticides	29		

PEST MANAGEMENT PROGRESS

EDITORIAL AND COORDINATING STAFF

Publisher:	J. A. Muir	Silviculture Branch
Editor	P. J. Humphreys	Silviculture Branch
Production:	B. Nicholson	

ADVISORS

Entomology:	P. M. Hall	Silviculture Branch
Forestry:	M. Wyeth	Silviculture Branch
Pathology:	J. A. Muir	Silviculture Branch
Pesticides:	J. F. Henigman	Silviculture Branch
Planning:	J. Crover	Integrated Resources Branch
Range Management:	R. B. Addison	Integrated Resources Branch
Research:	H. J. Benskin	Research Branch
Timber Management:	D. G. McPhail	Timber Harvesting Branch

Address all correspondence to:

Ministry of Forests
Silviculture Branch
31 Bastion Square
Victoria, British Columbia
V8W 3E7
Attention: Ms. P. Humphreys

PUBLISHER'S AND EDITOR'S NOTE

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

Contributions, labelled with an appropriate subject heading, should be submitted to the regional silviculture officer, or advisor, who will edit and forward them to Silviculture Branch. Pest Management Progress is submitted to the spring (May) and winter (December) meetings of the B.C. Forest Health Committee.

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

FOREST HEALTH - GENERAL

A Five-Year Strategic Plan for Forest Health. A Forest Health Strategic Plan is being written in order to give the program a clear direction. This document will be completed by August of this year in order to substantiate our budget requests for the next fiscal year.

With the transfer of forest health to the Silviculture Branch, it became clear that the section needed to plan its activities. This planning will allow forest health staff in the province to clearly understand their role in the new branch, and will allow forest health to be administratively incorporated into the Silviculture Branch.

In the past, the Forest Health Program has generally undertaken operations based on the availability of allocated funds. Bark beetle control operations have, for years, dominated the Program. While year to year plans were created, particularly for beetle control, no comprehensive plan has previously existed which described the overall purpose and objectives of our Program.

The Silviculture Branch Program has been carefully mapped out in a strategic plan. It is possible, using that plan, to measure where the Program will be going over the next five-year period. The objectives, and their corresponding measurable activities, come directly from site openings that have been created through logging. Clearly defined annual budgets can be derived from the silviculture plan which meet legal reforestation requirements and which also compose attractive economic investments through time. The plan also ensures that previously unachieved objectives do not become lost.

The Forest Health Strategic Plan will be created using the silviculture model. This will allow us to compare our program with the rest of the Silviculture Program, and will allow an easy integration of forest health into silviculture. We will be able to demonstrate the value of forest health treatments and expect to get reasonable annual funding to achieve our objectives.

There are some basic differences between the activities of forest health and those of the traditional Silviculture Program. In particular all, or most, silviculture activities are conducted on logged openings. Forest health beetle control operations are not done on openings. Furthermore, forest health has strategies and plans for occasional emergency pest outbreaks that need to be controlled. The Silviculture Program does not include planning for this kind of activity.

The Forest Health Strategic Plan will address the unique aspects of forest health. It will identify the most appropriate ways to allow forest health to meet its objectives without causing problems to the existing Silviculture Program. Anyone who wishes information on the Forest Health Strategic Plan should contact the author.

- J. Henigman, Silviculture Branch, Victoria.

Forest Health Problem Analysis on Silviculture Systems. After some delays, the much awaited forest health problem analysis on silviculture systems has been completed by Sterling Wood Group Inc. and W.F.S. Enterprises Ltd. The principle author was Dan Lousier who is now the forest science officer for the Prince George Forest Region.

The report is 75 pages long and has some large appendices. The assessment of the forest health information in the different silviculture systems is very comprehensive. As much as possible the interrelations between various pests are identified.

Reviews and recommendations are offered for every biogeoclimatic (BGC) zone. Five different silviculture systems are considered, including small clear-cuts, seed tree, shelterwood, selection, and group selection. A discussion of the utility of "New Forestry" is also provided. Each BGC zone is assessed for its potential use of the considered silviculture systems. Focusing on the more possible systems for each BGC zone, forest health issues are summarized.

Given a particular silviculture system in a BGC zone it is possible, using the report, to identify the likely forest health problems that may be expected. It is then possible from the report to determine areas of research which must be undertaken to clarify the extent of the problem and the appropriate control measures to be taken.

The report will be published soon as a Forest Resource Development Agreement document. Until then some copies of the consultant's report are available. For more information on the report contact the author.

- J. Henigman, Silviculture Branch, Victoria.

Pre-Harvest Silviculture Prescription Pest Survey Procedures for Partial Cuts. Under contract with the Forest Service, Kathy Lewis, of Industrial Forestry Service, has developed a pest survey procedure for Pre-Harvest Silviculture Prescriptions in partial cutting systems. Procedures were developed with reference to partial cutting in the 100 Mile House Forest District, so they are specific to that geographic area and to selection silvicultural systems. However, the principles are generally applicable.

A final report and procedural manual are available.

- M. Hamm, Cariboo Forest Region, Williams Lake.

Forest Health Training for Stand Tenders. The indefatigable Kathy Lewis of Industrial Forestry Service has produced, again under contract, a training module for persons involved in thinning. The emphasis of the package is on crop tree selection by workers, with an overview provided of stand selection/prioritisation and treatment options.

The module includes instructor's notes, a student workbook and audiovisual materials.

- M. Hamm, Cariboo Forest Region, Williams Lake.

Pest Standards/Guidelines for Northern British Columbia. Forest health staff from the Cariboo, Prince Rupert and Prince George Forest Regions met again in March to refine guidelines. These guidelines pertain to pest problems identified during pre-harvest silviculture prescription surveys and to standards to be applied during free-growing surveys.

The intent of this work is to establish an improved and consistent level of forest health management between the forest regions in northern British Columbia. While these guidelines are still at the draft stage, the Prince George Forest Region hopes to complete them by May, after industry comments are received.

- S. Taylor, Prince George Forest Region, Prince George

Forest Health Summer Students in the Prince George Forest Region. Nine summer students have been hired to work in various districts on forest health projects in the Prince George Forest Region in 1992. One student is from the Co-operative Education Program at the University of Victoria and the remaining eight have been hired under the Summer Youth Employment Program. They come from the University of British Columbia (U.B.C) and Guelph University, the British Columbia Institute of Technology (B.C.I.T) and Selkirk College. The following is a list of the institutions, academic programs and assigned working locations:

<u>Educational Institution</u>	<u>Academic Program</u>	<u>Assigned Forest Region/District</u>
U.B.C.	Forestry	Prince George Region
U.B.C.	Biology	Prince George Region
U.B.C.	Forestry	Robson Valley District
Guelph	Biology	Prince George Region
U.Vic.	Biology	Prince George Region
B.C.I.T.	Forest Tech.	Vanderhoof District
B.C.I.T.	Forest Tech.	Vanderhoof District
B.C.I.T.	Forest Tech.	Robson Valley District
Selkirk	Forest Tech.	Mackenzie District

For further information, please contact the undersigned.

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

Forest Management Planning Project. Sterling Wood Group has recently completed a forest health management assessment and plan for the Duncan Forest District. Due to a chronic lack of staff, Pat Hayes initiated the contract to provide a package of quick and concise reference material that staff could utilize to deal with forest health issues. Forest region personnel provided assistance and financial support for the contract. Specific goals of the project were to:

- a) Provide a systematic register of all significant pests in the District and document their incidence with respect to biogeoclimatic subzones, moisture regimes, site history, tree species, and forest management practices.

- b) Develop forest health management zones that encompass timber values, biogeoclimatic factors, land use and social (urban interface) considerations.
- c) Collate and tabulate pest control achieved via various management techniques and record all experimental trails and permanent sample plot locations established by federal, provincial and industrial organizations.
- d) Develop decision making methodology for assessing stand susceptibility, determining strategic approaches and formulating pest management prescriptions.
- e) List key references and authorities that provide important forest health management information.
- f) Develop a five-year forest health plan and budget.

Preliminary assessment of the product indicates that it is comprehensive, easy to use and well done.

- P. Hayes, Duncan Forest District, Duncan, and J. Fournier, Vancouver Forest Region, Burnaby.

Manual Brushing for Forest Vegetation Management in British Columbia. Sixty thousand hectares of British Columbia's forest land were brushed in 1989/90, at a total cost of approximately \$25 million. Manual brushing accounted for 37% (22 000 ha) of the area brushed, and 52% of the costs (\$12 million). Increased expenditures on manual brushing are expected with increased commitment by both the Ministry of Forests and Industry to improving the survival and growth of newly established forests and with reductions in the use of herbicides on forest land.

Some hardwood species, such as red alder, paper birch, trembling aspen, and black cottonwood, can be effectively controlled using cutting or girdling treatments. Manual cutting treatments can also be used effectively on slow-growing shrubs, such as white-flowered rhododendron, false azalea, and *Vaccinium* spp. However, single cutting treatments are generally not effective for controlling fast-growing shrubs or herbaceous vegetation. Instead, to control herbaceous vegetation, repeated treatments may be necessary within the same growing season. Bending herbaceous stems, rather than severing them, may be effective for reducing competition for light

and physical damage to crop seedlings, and may result in less regrowth during the year of treatment than would cutting treatments.

Factors that influence the utility of manual brushing are: (1) the response of target species to manual treatment; (2) the growth response of the crop trees; (3) damage to the crop trees; and (4) administrative constraints limiting the use of manual brushing. Response of target vegetation varies with species, environmental conditions, and method and timing of treatment. Reports conflict on the growth response of crop trees released by manual cutting, and the information relating to the optimum stand age for treatment is not available. Damage can occur to crop trees from tools used for manual brushing, from sunscald caused by the sudden opening of the canopy, and from slash and animals. Because it is a labour-intensive undertaking, the use of manual brushing may be limited by the availability of contractors who do this type of work.

The cost of manual cutting or girdling is highly variable. On a province-wide basis, the average cost of all manual brushing treatments is \$541/ha compared to an average of \$289/ha for chemical brushing treatments. However, because of differences in the areas treated using manual and chemical methods, these relative costs may not reflect real differences. Factors that influence costs include: the composition, size and density of the brush or target species, the relative height of brush and crop species, terrain, availability of contractors, and specifications of the contract.

Further research is required to document the effectiveness of single and multiple manual brushing treatments, especially in comparison to herbicide treatments, and to identify optimum times for treatment.

- P. Comeau, Forest Science Research Branch, Victoria.

White Pine Stratification Trial. Rod Martin Tree Services developed a new white pine seed stratification recipe. Existing techniques, employed by the Surrey Seed Centre, achieve only 40 - 60% germination rates, while the techniques employed by Rod, and others, achieve 80 - 95% germination. Present germination rates require double or triple sowing, which in turn limits white pine stock production to the root beds. Higher germination levels would help extend seed supplies and facilitate the production of container stock. Trials on this new technique will be conducted by the Surrey Seed Centre.

- J. Fournier, Vancouver Forest Region, Burnaby.

Lodgepole Pine Pest Damage Assessment. Systematic assessment of lodgepole pine pest damage at most of the provenance tests in the Interior will be started this summer. The objective of this project is to determine relationships between pest damage, site environments and seed sources. Success of this project requires extensive cooperation of our regional forest health staff because of the large number of tests throughout the Interior.

Several provenances, from Jackfish Creek south of Fort Nelson in British Columbia, and from Mount Watts and Hawk Hills in Alberta, escaped severe porcupine damage at the Mile 599 site along the Alaska Highway where porcupine virtually destroyed most of the plantation. To further assess the ability of the provenances to tolerate porcupine attack, an operational trial is being developed possibly involving the cooperation of Alberta Forest Service.

- C. Ying, Research Branch, Victoria

Screening and Selection for Genetic Resistance to the White Pine Weevil. Selection for putative resistant Sitka spruce in provenance tests and natural stands has been continued. We have reached the target number of 300 selections. Clonal tests using grafts, for accurate screening of genetic resistance, have been established for 200 of the selections. The tests are located at Espinosa Creek near Fair Harbour, and at Sayward. A recent suggestion of a resistant natural Sitka spruce stand at Miracle Beach is also being investigated. Hedge orchard for mass production of resistant trees is being developed. Our plan is to release 50 resistant clones in 1996-97 for reforestation use.

Assessment of weevil attack will continue this year for all interior spruce progeny tests at the Prince George Tree Improvement Station and at other locations with heavy weevil attack. Based on the results of these assessments, a plan for selection and screening of resistant interior spruce trees will be developed. Earlier assessments indicate large differences among families in resistance to weevil attack. The large number of trees in our interior spruce progeny tests will allow us to select for both resistance and volume production.

- G. Kiss and C. Ying, Research Branch, Victoria

Forest Health Projects at Silviculture Branch. In 1992-93, several projects are planned for key areas of the forest health program:

- o Business Information Systems. Val Fletcher and Pat Humphreys are coordinating several projects that resulted from the recent business area analysis for forest health. Projects include a tracking/management system for administrating projects, projects to record and use incidence and damage data, and purchase of, and training to use, work stations for regional and district staff.
- o Damage Assessments. Jeff Beale, on secondment to Research Branch, is coordinating several projects, mostly with regional staff, to determine the effects of insects and diseases on forest resources. Several projects are interrelated with the business information systems projects. Budworm and root disease modules for the stand projection model, PROGNOSIS, are also being calibrated for conditions in British Columbia.
- o Bark Beetle Benefit Analyses. Peter Hall will be coordinating a cost-benefit analysis of bark beetle strategies and programs to support the provincial program, and future budget requests.
- o Training. We plan to complete or develop several training modules to support regional training programs, and to supplement silviculture courses for surveys, tree species selection guidelines, and pre-harvest silviculture assessments.
- o Insect Suppression. Peter Hall is coordinating the Asian gypsy moth project, aerial spraying of budworm in the Kamloops Forest Region, a virus spray program for Douglas-fir tussock moth, and bark beetle projects throughout the interior of the province. All of these are implemented by region and district staff.
- o Strategic Plan. John Henigman, with substantial input by regional staff, is developing a strategic plan for the forest health program. The objective is to outline the issues, opportunities, direction, goals, and resources needed for an expanded, province-wide, forest health program.

Details and further information on these projects are presented in this report, or are available from branch and region staff.

- J. Muir, Silviculture Branch, Victoria.

Results of the Forest Health Surveys Questionnaire. The Forest Health Program is developing an information management strategy to improve the quality and accessibility of information required by program staff to deliver their services. As part of a project initiated through the Program's Business Area Analysis, a forest health surveys questionnaire was distributed to selected silviculture/forest health staff at the branch and in the forest districts and regions.

The questionnaire was intended to solicit opinions on the relative value of forest health information available from external sources, and the Program's sampling methods, survey objectives and the ultimate use of the resulting data. The results of the survey will influence data acquisition strategies and the initial design of standard survey method, for the Forest Health Program.

The questionnaire has two sections, one pertaining to the use of information from sources external to the Program (e.g. Forestry Canada, Inventory, Valuation and other sections of Silviculture) and the other pertaining to existing forest health surveys.

Response to the questionnaire was high, with 22 out of a possible 35 people returning the questionnaire.

In terms of the relative value to the program of external sources of data, both Forestry Canada's aerial survey and pests of young stands information were highly rated. Comments indicated that the aerial surveys are valued as an overview which provides information for more intensive and directed survey or control actions. Pests of young stands information is also useful to forest service staff as an indicator of where forest health stand tending activities may be necessary.

With regard to surveys conducted by other sections of Silviculture Branch, Pre-Harvest Silviculture Prescription, Pre-Stand Tending and Free-to-Grow surveys were the most highly valued because of the critical importance of forest health input.

There was also an overall strong agreement that the creation of a standard forest health survey methodology would benefit the Forest Health Program. It was generally agreed that forest health ground surveys should be used to intensively sample in areas where the presence of the pest has already been identified and/or there has been an historical risk. However, it was difficult to determine from the responses any consensus on such things as the most appropriate type of sample plot to minimize sampling error and/or data collection costs (e.g. fixed radius, variable radius, fixed width strip etc.).

A complete summary of the results of the forest health surveys questionnaire is available from Pat Humphreys. Graphics on the forest health surveys questionnaire are located on pages 39-41 of this issue.

- P. Humphreys, Silviculture Branch, Victoria.

New Manager of Nursery and Seed Cultural Extension. It is my pleasure to announce that Mr. Don Summers is the new manager of Nursery and Seed Culture Extension of the Silviculture Branch, Ministry of Forests. This position is located in Victoria, at Silviculture Branch, and after April 1, 1992, at the new office located at Green Timbers Nursery.

Don holds a Bachelor of Science in Biology, and a Masters of Pest Management. Don has been employed for ten years with the Silviculture Branch, Ministry of Forests, in the capacity of pest management officer of seed production in seed orchards.

The manager of Nursery and Seed Extension will be responsible for supervising a team of specialists to provide extension services to the forest nursery industry and Seed Orchard Program. The team of specialists provide cultural information and procedures to container and bareroot nurseries. Advice is offered on nutrition, pest control, irrigation, stock types, scheduling and other aspects of production.

- D. Brazier, Silviculture Branch, Victoria.

Nursery Pest Management Update. During the past year there have been several major changes in the Nursery and Seed Orchard Pest Management Unit. Don Summers is now the manager of nursery extension services, and his job as seed production pest management officer has been temporarily filled by Rob Bennett. The seed orchard group will be moving from their Victoria offices to a new building at the Saanich Seed Orchard. The nursery group will be moving from Surrey Nursery to a new facility at the Green Timbers Reforestation Centre. We also have a new position of Christmas Tree Specialist which has been filled by Diane Gertzen. Finally, the Pest Management Unit has been divided and has two different managers, one for nurseries and one for seed orchards.

Keithia foliar blight of western red cedar has become a major pest, especially at coastal nurseries. During the 1991 growing season over one million seedlings were culled due to this disease. An extensive research program to gain information on the biology of this disease, and to develop management programs has been initiated by Dr. J. Sutherland of Pacific Forestry Centre in cooperation with Silviculture Branch.

Several other projects are planned. Studies to determine if cultural practices such as fertilizer or irrigation regimes will enhance or reduce *Cylindrocarpon* and

Fusarium-caused root rots will be conducted in cooperation with Paige Axelrood at B.C. Research. The animal repellent Anipel will be tested for its effectiveness at reducing browsing by deer and other herbivores. Possible phytotoxic effects to conifer seedlings and movement through plant foliage will also be assessed. Work with the plant growth regulator paclobutrazol which induces bud-set and enhances root growth will be expanded. This project is being supported by ICI Chipman. Finally, we are continuing to test the natural insecticide, neem, in cooperation with Dr. Murray Isman at the University of British Columbia.

- G. Shrimpton, Surrey Nursery, Surrey.

Roadside Tree Injury Assessment. The inter-ministry Roadside Tree Injury Committee contracted an assessment of several roadside sites in British Columbia where trees were injured apparently because of highway de-icing salt.

Results indicated that de-icing salts were the major cause of injury. A lengthy contract report is being reviewed, and follow-up work in 1992 is being planned.

Ministry regional staff are assisting in the rehabilitation of damaged trees at Boitanio Park at Williams Lake.

- J. Muir, Silviculture Branch, J. Van Barneveld, Integrated Management Services Branch, Ministry of Environment, Lands and Parks, and A. Planiden, Highways Design and Planning, Ministry of Transportation and Highways, Victoria.

Acknowledgements. An article appeared in the previous issue of Pest Management Progress concerning a 1990-1991 seed orchard beneficial insect and arachnid survey. I would like to acknowledge Dr. Lee Humble and Mr. Bob Duncan of Forestry Canada for contributing equipment, identifications and advice.

- M. Schmidt, Silviculture Branch, Victoria.

FOREST ENTOMOLOGY

1992/93 Bark Beetle Program. The 1992/93 bark beetle program will continue to give priority to infestations of mountain pine beetle, spruce beetle, and Douglas-fir beetle throughout the province. Activities and priorities will remain essentially the same as in past years. The total allocation for bark beetle and related activities is approximately \$4.5 million. This amount also includes some funding for activities relating to the western spruce budworm and the Douglas-fir tussock moth, as well as the Habitat/Silviculture/Protection account. Additional funds have been provided for the Asian gypsy moth eradication project in Vancouver.

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

Cost/Benefit Analysis of Bark Beetle Management - A study examining the costs and benefits of the bark beetle management program will be carried out in 1992/93. This study will be along similar lines as the study on the benefits of controlling western spruce budworm with *Bacillus thuringiensis* Berliner var. *kurstaki* (B.t.k.) done by the consultants, Deloitte and Touche, in 1990. The intent of the study is to quantify the effectiveness of the program in reducing the spread of bark beetles. A request for proposal will be developed in the early summer and, hopefully, a contract will be awarded to a consultant firm by mid-summer. Results will be expected by the end of the fiscal year.

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

Better Beetle Abatement with Boron? Can a revolutionary, safe new wood preservative, anhydrous sodium octaborate, Impel^R, be used to treat or protect lodgepole pine from mountain pine beetle attack? Assuming a federal research permit is approved and a provincial special use permit is issued, a rate and time experiment will be performed this summer in the Bulkley Forest District. The boron compound is applied as a 12 x 100 mm crystalline rod that is inserted into a pre-drilled hole in the sapwood. Once in contact with water, the rod will dissolve and spread throughout the sapwood. The compound has been found to be an effective inhibitor of wood-rotting fungi but has never been tested against the mountain pine beetle's symbiotic blue-staining fungi. It is hypothesized that the chemical will inhibit fungal growth and prevent the beetles from successfully

establishing brood. The manufacturer suspects that there may be significant phytotoxicity which may limit the application to post-attack treatment.

This summer's trial will test three rates (four, eight, and twelve rods per tree) and three application times (three weeks before flight, one week post attack and two weeks post attack). The test site will be located in a mature lodgepole pine stand with an active mountain pine beetle infestation that will be left unlogged because of slope stability concerns. A maximum of two hundred trees will be baited in mid-June.

Preliminary results should be available in the fall issue of Pest Management Progress.

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

Spruce Beetle Dispersal from Log Decks in the Mackenzie Forest District. Forestry Canada, the Ministry of Forests and Fletcher Challenge will conduct a study in the spring of 1992 to determine whether spruce beetles from infested spruce logs in a millyard are likely to escape. The results will affect decisions on whether to transport infested wood by road or water.

A central beetle source in the millyard will be created, surrounded by eight piles of 50 uninfested green logs located 25 and 50 metres away in four cardinal directions. The beetles released will be marked using Day-glo fluorescent pigment. Five groups of four green logs will be placed along the nearest stand edges in sheltered locations. Two groups of four Lindgren funnel traps with pheromone baits will be placed in the forest beyond the groups of four logs, at a distance of approximately 100 metres from the stand edge.

Beetles will be trapped by spraying, until run-off, two 2-metre strips on all uninfested logs with 2% Sevin^R (active ingredient is carbaryl) in water and placing screen traps to catch dead beetles as they fall off. Some beetles will also be taken in the funnel traps. At the termination of the experiment, the log piles will be disassembled and all logs sampled for attacks.

- S. Taylor, Prince George Forest Region, Prince George

Douglas-fir Beetle Control in the Invermere Forest District. Douglas-fir beetle has been slowly removing Douglas-fir trees at the rate of about 1% per year in several stands in the Invermere Timber Supply Area, including two provincial parks and one resort. In a few locations the loss rate has increased to 10% each year for the last three years. Ground surveys have also identified a high relationship between Douglas-fir bark beetle and armillaria root disease.

The current concern about losing large areas of Douglas-fir trees is magnified due to our dependance on Douglas-fir for visual cover, thermal and wildlife hiding cover and the social requirements in the parks and resort. Due to the root rot, calcareous soils, and visual quality objectives, management options are somewhat reduced.

This problem has lead to the search for a more attractive Douglas-fir beetle pheromone which can be used to attract Douglas-fir beetles into clearings such as clearcuts, hayfields, golf courses, and meadows. Such a pheromone must also be useful for determining population trends and as a tree bait.

Cooperative research with the University of Calgary since 1987 has proven fruitful. A new pheromone combination is showing very good success when used for diversionary baiting. The pheromone combination has been tested in clear-cuts three and four years after logging; in a hay-field located 350 metres away from Douglas-fir trees; along road right-of-ways; near areas that can be single-load logged; in meadows 100 meters away from Douglas-fir trees, and in non-host stands. It has also been used in single-load logging areas as a tree bait. This bait attracted a Douglas-fir beetle population into a three hectare block and obtained a 45% attack rate. The bait is not available commercially, as further trials are being conducted. Concern has been expressed that this bait may be too powerful and could be problematic if not used properly.

A report by Dr. Hal Wieser and Dr. Lis Dixon has been prepared describing the trials and results over the past two years in Invermere Forest District. This year several trials are being conducted in a few other forest districts, including one in the United States, to confirm use recommendations. Currently the recommended use is in open areas over 100 metres away from any Douglas-fir trees using Lindgren funnel traps, or as a tree bait in stands where Douglas-fir can be harvested using a clear-cut system. Additional trials for use in selective logging areas are being conducted. For more information please contact Emile Begin, Forest Health Officer, Invermere Forest District.

- E. Begin, Invermere Forest District, Invermere.

Beetles and Parks in the Prince George Forest Region: Bark beetles again caused problems in Carp Lake and Mt. Robson Provincial Parks, Kakwa Recreation Area and the Chunamen Creek Ecological Reserve. Forest Service, parks and industry staff are working together to survey, assess and, where necessary, treat these problems:

- Mt Robson Provincial Park: Two spots with approximately 120 trees were infested with mountain pine beetle. Parks employees conducted baiting and single tree disposal, and forest service staff did the aerial and ground detection. Control work has been ongoing for at least five years;
- Kakwa Recreation Area: Blowdown was discovered in spruce stands in this area in 1990. Ground surveys were then conducted in 1990 and 1991, with Parks providing the helicopter and the Forest Service the beetle expertise. Minor spruce beetle populations have been identified and parks and forest service staff are currently assessing the problem;
- Carp Lake Provincial Park: A lethal trap tree program and other single tree treatment activities have been conducted in and surrounding this park for two years to control the spruce beetle. This program has been funded equally by the Ministry of Parks and the Ministry of Forests. The current program has been successful and monitoring is planned for 1992; and
- Chunamen Ecological Reserve: A serious outbreak of spruce beetle is occurring over approximately 100 hectares. This infestation has been surveyed and parks, industry and Forest Service staff are currently developing plans to reduce the threat to commercial timber stands.

- S.Taylor, Prince George Forest Region, Prince George

Pre-attack Treatment of Boron to control the Mountain Pine Beetle. In co-operation with the Prince Rupert Forest Region, Impel^R, a commercial preparation of boron wood preservative (active ingredient 100% anhydrous disodium octaborate), will be tested against mountain pine beetle in treated lodgepole pine in the Vanderhoof Forest District. Several lodgepole pine trees will be baited with semiochemicals and treated with one or more of the available boron formulations in mid-June 1992. The objectives of the trial are: 1) to determine if mountain pine

beetle adults will readily attack, and not be repelled from, treated trees, and 2) to ensure that boron dosages are sufficient to prevent brood development. Impel is odourless and non-corrosive and has a relatively low mammalian toxicity. For further information, contact the undersigned.

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

Revision of Bark Beetle Codes for Cruising. In training district, licensee, and contractor personnel in bark beetle identification and ground detection, it has become increasingly clear in the past few years that the bark beetle codes in the Cruising Manual and on the Cruise Tally Sheet (FS 205) require revision. For example, the existing codes employ outdated and erroneous references to green, red, and grey-attacks that supposedly equate the timing or year of attack to, among other things, how long it takes tree foliage to turn various colours. Such classifications are confusing and inaccurate - particularly when employed for the spruce beetle. Furthermore, there is no current provision for classifying partial or strip-attacks.

To discuss proposed changes to the bark beetle codes, forest health and cruising staff from the Prince George, Prince Rupert, and Cariboo Forest Regions met in Prince George on February 13, 1992. The issue was also addressed at the Northern Interior Cruising Committee's annual meeting in Prince George on February 27, 1992. It was agreed that the proposed changes were appropriate and workable but they would have to be reconciled for now with the existing cruising compilation program. Consequently, an initial test of the revised codes will be undertaken this year by operational cruisers in the Prince George Forest Region. If successful, it is anticipated that changes in beetle coding will follow for northern British Columbia and, eventually, the entire Province. For further information, contact the undersigned.

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

Spruce Beetle in the Bowron Lake Park. Extensive windthrow in 1990 created the potential for a spruce beetle outbreak in Bowron Lake Park. The blowdown was assessed in 1990. It was found that beetles were present at low population levels and that susceptible blowdown spruce was present in all areas.

A program of aerial and ground detection, coupled with the placement of 300 lethal trap trees, was undertaken in the spring of 1991. The lethal trap trees were effective in most cases.

Spruce beetle population levels remain low in the park. No standing attack was detected and the 1990 windthrow will not be susceptible to beetle attack in the spring of 1992. The 1992 beetle flight is expected to be low.

A reduced monitoring program is anticipated for 1992.

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

Reporting of Bait Use. Last spring, the Forest Service agreed to provide the Pesticide Management Branch of the Ministry of Environment, Parks, and Lands with a report which summarized the use of semio-chemical baits for bark beetle management, in lieu of a need for pesticide use permits. The report, submitted this spring, provides a summary of bait use for the mountain pine beetle (46, 186 baits), the spruce beetle (6, 735 baits), and the Douglas-fir beetle (1, 562 baits). These totals include use by both the Forest Service and forest industry. Baits were used for containment prior to harvest, enhancement of single tree disposal, and for population monitoring. All baits used were commercially produced by Phero Tech Inc. of Delta, British Columbia.

Semio-chemical baits are also used by industry to mass-trap ambrosia beetles to reduce pin holes and the resultant degradation of lumber value. Baits are placed in static, retrievable traps around log sorts, mill areas, and other locations where damage is possible. Insect species specifically trapped in these programs are *Trypodendron lineatum* (6, 862 baits), *Gnathotrichus sulcatus* (1, 411 baits), and *Gnathotrichus retusus* (718 baits).

All pheromones used in baits for the insects mentioned above are naturally occurring semiochemicals that have been synthesized and produced commercially. Reports similar to the one submitted this spring will be prepared annually.

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

Spruce Budworm Control in the Fort Nelson Forest District. In late May and early June, 1992, approximately 570 hectares of mature spruce seed production stands in the Fort Nelson Forest District will be treated with two aerial applications of the biological insecticide, *Bacillus thuringiensis* Berliner var. *kurstaki* (*B.t.k.*) in an attempt to reduce defoliation and top-kill by the spruce budworm, *Choristoneura fumiferana*. Four locations, encompassing a total of six blocks, will be treated with a water or oil-based formulation of *B.t.k.* As in past years, the project is a co-operative effort between forest service regional and district staff. Contract tender bids for the aerial application are due on or before April 16, 1992. For further details, contact the undersigned.

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

Western Spruce Budworm Program. Plans are in full swing for the 1992 spruce budworm spray program. The proposed areas to be treated with *B.t.k.* this summer are as follows:

Kamloops Forest District:	8,000 ha
Salmon Arm Forest District:	12,000-14,000 ha
Vernon Forest District:	10,000 ha
Penticton Forest District:	5,000 ha
Lillooet Forest District:	200 ha

Spring second-stage larvae sampling has now been completed and except for areas in the Vernon Forest District the numbers are indicative of moderate defoliation levels in the areas designated for treatment.

However, nothing is that simple! Due to the unusually warm, mild winter and early spring which we have had in the Interior as well as in most of southern British Columbia, the budworm has become active far too early in some areas. In low elevation sites, high proportions of needle mining in the old foliage was noticed in April, long before the buds on the trees had begun to swell. This could indicate a significant decrease in the budworm population this summer. We are in the process of closely monitoring the extent of needle mining and bud development in our project areas. If a significant amount of mortality occurs, the program will be greatly reduced in many of the districts.

- L. MacLauchlan, Kamloops Forest Region, Kamloops.

Douglas-fir Tussock Moth Program. The Douglas-fir tussock moth continues its population increase in the Kamloops Forest Region. Four areas have been identified for treatment with the nuclear polyhedrosis virus (NPV) in 1992. Three sites are in the Kamloops Forest District, one site in the Merritt Forest District and one site (the control area) in the Vernon Forest District.

	<u>Location</u>	<u>Area</u>
Kamloops:	Indian Gardens	250 ha
	Dome fire area	60 ha
	Sabiston Creek	60-100 ha
Merritt:	Rattlesnake Reserve	40 ha
Vernon:	Ecological reserve (for rattlesnakes)	5 ha

NPV (Virtuss^R) will be applied over the entire Indian Gardens, Dome Fire and Rattlesnake areas; Sabiston Creek will be treated with alternate spray swaths. Expected application time will be in early June.

- L. MacLauchlan, Kamloops Forest Region, Kamloops.

Saving Kitimat Valley Spruce from the White Pine Weevil. Reforestation of progressive clearcuts in the Kitimat Valley with Sitka spruce in the mid-1970's produced a major white pine weevil problem. Currently, more than 50% of the stems are attacked per year in some plantations, and most trees are of poor form and height. Kalum Forest District staff and licensees requested that a white pine weevil symposium be held for their benefit to update them on the latest research information on weevil biology, impact and management.

The symposium was held on March 12 in Terrace and the audience was limited to about 35 local forest service, licensee and consulting foresters. Before the symposium, speakers and attendees from other forest regions participated in a full-day field tour of the Kitimat Valley. The tour allowed the symposium speakers to fully understand the complexity and magnitude of the issues before they addressed the local foresters.

The symposium covered many topics presented by experts from Canadian Pacific Forest Products (CPFP), the University of British Columbia (UBC), the B.C. Forest Service (BCFS) and Forestry Canada (FORCAN). Topics covered were: weevil biology (John

McLean, UBC), genetic resistance (Cheng Ying, BCFS), impacts (Rene Alfaro, FORCAN), bio-control (Michael Hulme, FORCAN), hazard rating (Stuart Taylor, BCFS), chemical control (Gerry Fraser, CPFP), silvicultural control (John McLean, UBC), industry's solutions (Kevin Derow, Skeena Cellulose Inc.), and the economics of plantation rehabilitation (Kim Hayworth, Pacific Regeneration Technology). An open discussion followed in an attempt to map out the local research and operational needs.

Proceedings from this symposium will be available from the Prince Rupert Forest Region office in July. Please contact Tim Ebata (847-7479) if you would like a copy.

The symposium was judged to be a success since the attendees left better informed and aware of the current issues in white pine weevil management.

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

Voracious Moth Larvae Feed Heavily on Lodgepole Pine Dwarf Mistletoe Shoots in the Prince George Forest Region. In late September 1991, lepidopterous larvae were collected in several locations in the Prince George and Vanderhoof Forest Districts. These larvae were found feeding voraciously on mistletoe aerial shoots. Many trees had close to 100% aerial shoot defoliation at each location. This damage had been frequently observed over the last three years but no attempt was made to capture and raise whatever was doing the feeding.

Last fall numerous caterpillars were collected and raised on infected pine shoots which were kept watered until the caterpillars had pupated. After two months of refrigeration and almost three months of room temperature two moths emerged.

The moths were identified by Bob Duncan of Forestry Canada as *Dasyppa alternosquamella* of the Pyraeidae family. A large collection and rearing project is scheduled this year in order to learn more about these moths and their predators and parasites.

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

Gypsy Moth (North American Strain). Eradication programs for the North American strain of the gypsy moth are planned for the Colwood (near Victoria) and Parksville areas during the spring.

Areas to be treated are 319 ha in Colwood (aerial spray only) and 179 ha in Parksville (aerial spray with smaller areas treated by ground application). *Bacillus thuringiensis* Berliner var. *kurstaki* (*B.t.k.*) (Foray 48B^R) will be used in both programs. Agriculture Canada will be conducting the treatment programs.

- P. M. Hall, Silviculture Branch, Victoria

Gypsy Moth (Asian Strain). An eradication project is being carried out in the Vancouver area for the Asian gypsy moth which was introduced to the area in the summer of 1991 by Russian grain freighters originating from infested ports in eastern Russia.

The eradication project is comprised of aerial and ground sprays with *B.t.k.* (Foray 48B^R) followed by intensive trapping. Total area to be aerially treated is approximately 18 500 ha, and area to be ground treated is approximately 700 ha.

This project is a joint program with 50% sharing of funding between Agriculture Canada and the Province. The total cost of the program is estimated to be \$6.3 million. Agencies involved with various aspects of the program include Agriculture Canada, Forestry Canada, the Ministry of Agriculture, Fisheries, and Food, the Ministry of Forests, and the Greater Vancouver Regional District. Other agencies have also expressed their support for the program.

Similar programs are also being carried out in the Tacoma area of Washington State, and in Portland, Oregon.

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

FOREST PATHOLOGY

Laminated Root Rot Incidence And Hazard Rating Trial. Phero Tech Inc. recently completed laminated root rot surveys of incidence (estimation of *present* disease level) and ratings of polygons in the Coastal Douglas-fir and Coastal Western Hemlock biogeoclimatic zone portions of the Duncan, Port Alberni, Campbell River, and Powell River Forest Districts.

Stratified random field samples collected and analyzed in previous years provided relationships between disease incidence and biogeoclimatic zone, inventory type group, age class and site class. Relationships were matched with pertinent polygon attribute information in the Inventory Data Base to produce stand level incidence potentials.

In two test forest districts, hazard (*projected* disease incidence potential) ratings were developed to compliment the incidence ratings. Hazard ratings were especially useful in the assessment of immature stands that are too young for the disease to fully express itself. Both incidence and hazard information was colour themed on forest cover maps, listed in an electronic data base, and described in summary graphs and tables.

- J. Fournier, Vancouver Forest Region, Burnaby.

Research into the use of Glyphosate in Laminated Root Rot Management. Under the guidance of Dr. Zamir Junja, Simon Fraser University, Kevin Wanner, graduate student, is investigating the potential for stump and basal applications of Vision^R (active ingredient is glyphosate) to enhance the colonization of laminated root rot infected materials by antagonistic fungi.

Twenty-year old Douglas-fir saplings were treated with Vision and their root systems were periodically sampled for colonizing fungi. Results from year one of the three-year study were inconclusive due to the timing of the applications and the invasion of treated and control stumps by *Hylastes nigrinus*, *Ceratocystis* spp. and *Leptographium wageneri*.

It is hoped that Vision treatments of fresh stumps or injections into living infected trees will help contain and even reduce the persistence of laminated root rot inoculum.

- J. Fournier, Vancouver Forest Region, Burnaby.

Disease Survey Techniques for Juvenile Stands. Pathfinder Forestry Services has compared a variety of sampling regimes and techniques to quantify and characterize pre-spacing disease levels in a 12-year-old Douglas-fir stand. Line intersect, strip and fixed area plot sampling techniques were compared for their ability to capture information on armillaria root disease and laminated root rot. Line intersect and strip sampling methods provided the most accurate and efficient estimates of disease levels. Fixed area plots of 50 and 100 square metres failed to adequately estimate disease levels or distributions. Results seem to confirm that the standard 20 square metre pre-stand tending plots do not satisfy forest health information needs. This preliminary investigation will be followed by a more definitive trial.

- J. Fournier, Vancouver Forest Region, Burnaby.

Tomentosus Root Rot Surveys in the Oldest Spruce Plantations in the Prince George Forest Region. Walk-throughs done on an ongoing basis have been used to determine the extent of tomentosus root rot. To date, 35 of our oldest white spruce plantations and experimental projects have been assessed for tomentosus incidence and extent. All 35 stands had tomentosus, usually at a very low incidence (i.e. maximum 5% symptomatic trees by age 20 years).

Five plantations were surveyed this winter using a 10% sampling intensity. The results indicate that walk-throughs are sufficient for a reasonable estimate of root rot incidence.

Several large stem-mapped plots were established in order to track the rate of spread, rate of mortality, and species susceptibility over time. These plots will also be used to determine the ability of tomentosus to spread from stumps to young trees, and also, in the second phase, from tree to tree.

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

Second Spruce Root Rot Fungus Collected in the Prince George Forest District. Basidiocarps collected from a stump in a lodgepole pine progeny trial in the Bowron Valley were positively identified by Dr. Brenda Callen as *circinatus* root rot. The

basidiocarps were sessile, contained curved setae only, and were distinctly more robust than the *Inonotus tomentosus* basidiocarp, associated with tomentosus root rot.

Although the extent of this second *Inonotus* species is thought to be quite limited, an intensive evaluation of the progeny trial is scheduled for this summer. All stumps in the trial will be mapped and assessed for root and butt rot. Isolations will also be made to confirm *I. circinatus* from culture.

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

Coldstream Root Removal Trial in the Dawson Creek Forest District. The first operational root removal (stumping versus pushover logging) trial in the Prince George Forest Region was established in December 1991 in the Dawson Creek Forest District. The project involved four hectares of pushover logging and four hectares of stumping. The trial area consists of a five-hectare evenly infected gentle slope divided into three treatment units - pushover, stumping, and control. Tree species present were white spruce, lodgepole pine, trembling aspen and balsam poplar. The large range of diameters within each of these species proved valuable in testing the limitations of both treatment types.

Overall, the treatment worked very well. The success can be attributed to the skill and care demonstrated by the operator who designed and perfected an innovative alternative to an excavator bucket which looks like a large four-toothed claw. Other success factors were the timing of treatment (enough frost in the ground, but not too much), and the relatively coarse sandy loam soil.

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

Forest Pathology Summer Student Projects in the Prince George Forest Region. Three districts will have students this year. Robson Valley students will focus on determining the extent of armillaria root disease, through surveys and the assessment of permanent sample plots (Inventory growth-and-yield, progeny, provenance, and forest health rate of spread plots).

Prince George Forest District students will survey for tomentosus root rot, and assess and establish permanent sample plots. Their work will also involve a growth-and-yield component supervised by the regional growth-and-yield transfer employee.

The Vanderhoof Forest District crew will conduct multipest surveys on stands scheduled for juvenile spacing. They will also work on projects assessing the rate of reinvasion of lodgepole pine dwarf mistletoe into plantations and a geographic information systems project to determine the extent and severity of mistletoe in mature stands.

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

White Pine Seed Production Progress. Seedlots collected from candidate blister rust resistant and tolerant white pine trees on Texada Island are now being sewn for use in out-planting trials. Trials will be established in the spring of 1994 at various geographic locations and under a wide variety of biogeoclimatic conditions. Trials will be assessed at regular intervals by a regional contractor. Results will help determine whether or not the rust resistance or tolerance exhibited by the parents is the result of environmental or genetic influences.

The Sunshine Coast Forest District is also establishing more out-planting breeding programs.

- J. Fournier, Vancouver Forest Region, Burnaby, and
R. Diprose, Sunshine Coast Forest District, Powell River.

MAMMAL DAMAGE

The Effects of Different Western Red Cedar Stocktypes and Protective Devices on Deer Browse in the Queen Charlotte Islands. Six different Western red cedar stocktypes, 1-0 PSB313B, 1-0 PSB415D, 1-0 PSB615A, 1+1 PBR313 and 1+1 PSB615A, will be planted with and without VEXAR and TUBEX protective devices to assess cost effectiveness of various treatment combinations for both survival and growth. As well, planting will occur in the fall of 1992 and the spring of 1993 to determine if planting season affects the level of deer browse.

- B. Broznitsky, Vancouver Forest Region, Vancouver and M. Salzl, Queen Charlotte Islands Forest District, Queen Charlotte City.

Vole Population Monitoring in the Vancouver Forest Region. A cooperative pilot study is being conducted by Vancouver Forest Region and Silviculture Branch to assess costs and effectiveness of live trapping and release methods used in small mammal population studies. Two or three sites will be studied in the Chilliwack and Squamish Forest Districts. Trapping will occur at two week intervals commencing in late spring and continuing until early winter.

- B. Broznitsky, Vancouver Forest Region, Burnaby and J. Henigman, Silviculture Branch, Victoria.

PESTICIDES

Pesticide Management Branch Stakeholder's Forum. On March 18, the Pesticide Management Branch (PMB) conducted a stakeholder's forum in order to obtain input from interested public groups and agencies concerning their draft Pesticide Management Five Year Strategic Plan. A total of 72 representatives (eleven representing forestry interests and two from the Ministry of Forests) attended the day long meeting in Vancouver.

Last year PMB published their draft strategic plan, entitled *New Directions in Pesticide Management*. Comments were solicited on the document and recently a paper summarizing the written responses to the draft strategic plan was also published. According to PMB their mission is to promote integrated pest management strategies and regulate pesticide use to achieve a sustainable environment for British Columbia. Their mission principles are as follows:

- to protect environmental resources and human health;
- to provide information to the public about pest management strategies;
- to involve the public in key decisions affecting pesticide management activities; and
- to reduce hazardous and unnecessary pesticide use in the province.

As may have been expected, there was a wide range of opinion offered regarding the appropriateness of pesticide use and the role of PMB in regulating it. Most agreed, however, that more time for discussion was needed.

Apparently PMB intends to continue the discussion with a select group of stakeholders. They envision a group of 8-12 interest groups. Naturally we believe that the B.C. Forest Service should be represented in that group. Anyone who wishes more information on the PMB strategic planning process as it relates to forestry should contact the author.

- J. Henigman, Silviculture Branch, Victoria.

Changes Planned for the Federal Pesticide Registration System. The following review is an edited version of a presentation made to the Northern Interior Vegetation Management Association, in Prince George on March 30, 1992.

There are important changes in store for the Pest Control Products Act. As most of you may be aware, the Pest Control Products Act regulates the sale and use of pesticides in Canada. The process by which pesticides become available, and the way they are used will undergo some significant changes in the next six years.

Approximately five years ago the Government initiated the formation of a Pesticide Review Team to look into the pesticide registration system in Canada. This was seen as necessary because many interest groups have for years been vocal about their dissatisfaction with the current pesticide registration system. In 1990, the team completed its report. The Government has decided to implement most of the report recommendations.

Over the next six years the Government has made a commitment to spend \$81 million on changes to the registration system. Much of the money for the changes comes from the "Green Plan". The money will create 276 new staff positions.

The basic structure of the registration system will continue to involve Agriculture Canada in the day-to-day business of managing the registration program. However, all policy and registration decisions will be made together by the Ministers of Agriculture, Environment, and Health and Welfare. One would hope that this authority sharing does not slow the system to a snail's pace. The Minister of Forests is not involved in final decisions. The responsibility for Fisheries and Oceans concerns will be handled by Environment Canada.

The pesticide review team report recommended a stand-alone agency to handle pesticides. This was rejected by the Government as too costly and disruptive of the civil service.

So what do we get for our money?

According to the press release we will have increased resources to register new, and safer pesticides. A more formally defined timeline for processing registration applications will be adhered to. Also, the Minor Use Registration Program will be enhanced. All of these items should be valuable to forestry.

Of particular importance in the new system is the liaison that will be established with the public and with user groups. Very prominent in this liaison is the establishment of a Pest Management Alternatives Office whose primary objective will be to reduce the use of pesticides in Canada. Transfer of health and safety information to the public and applicators via the Workplace Hazardous Materials Information System program will be a priority.

To address the issue of public consultation, an advisory council of public representatives will be set up immediately to advise the Government on policy and priorities. A Pesticide Management Secretariat is being organized to facilitate the work of the advisory council.

The public will be notified of all applications for pesticide registration. Registration data will be available and comments from the public will be solicited as part of the registration process. In the technical evaluation of pesticides all parts of the formulations will be scrutinized. As well, older pesticides will have their data packages upgraded and reviewed with public input. Within the rewritten Pest Control Products Act the new roles and responsibilities of Health and Welfare and Environment will be clearly defined. Finally, the system will allow appeal of decisions by the public.

The name Pest Management Alternatives Office was specified by the Government and not the Pesticide Review Team. It will have a mandate to support the integration of pest management with broader goals of environmental sustainability.

The office will be a stand-alone agency able to offer advice to government agencies and all pesticide use sectors. It will have a budget of \$12 million over the six-year period. The purpose of the office will be to heighten awareness of ecologically sound pest management strategies, and to reduce the health and environmental risks associated with pest control while optimizing pest control efficacy. It will also be committed to reducing pesticide use.

The Pest Management Alternatives Office will also do the following:

- establish a computerised information system on alternative pest control methods;
- set priorities and fund research;
- set targets for pesticide use reduction; and
- publish a newsletter.

I am very encouraged that the new system will meet public needs much better than has been the case. Since the public pays the bills, they have a right to be satisfied. I am less encouraged however, by the likely effects of the new system on forestry. With little lobbying or decision making authority I expect that forestry will be a target for pesticide reduction.

- J. Henigman, Silviculture Branch, Victoria.

Environment Canada, Atlantic Region, May Lay Charges Over Fenitrothion. Things are heating up between Environment Canada and the Province of New Brunswick. In the past few years Environment Canada, Atlantic Region, has become increasingly concerned about the application of fenitrothion for eastern spruce budworm control. In 1989 Environment Canada published a report of monitoring results, entitled *Environmental Effects of Fenitrothion Use in Forestry*. This report highlights problems with birds, insect pollinators and aquatic invertebrates. They concluded that the registration for fenitrothion should be re-evaluated. Agriculture Canada is currently reviewing the registration package for the insecticide.

Apparently there has been no reduction in the use of fenitrothion since the report was published. In 1991 Environment Canada took samples of spray residue in order to potentially initiate legal charges. No charges have been laid to date. Agriculture Canada is proceeding with a registration review of the insecticide and perhaps the conclusion of that review will satisfy the concerns of Environment Canada. If charges do proceed one could expect the hearing to become a platform for environmentalism advocacy. Anyone wishing a copy of the fenitrothion report, or an update on the status of fenitrothion use in New Brunswick, should contact the author.

- J. Henigman, Silviculture Branch, Victoria.

Forestry Use of B.t.k. Cancelled in Ontario This Year. The Government of Ontario cancelled spraying *B.t.k.* for forestry insect control this year as a cost saving initiative. The province will save about \$4 million. This will affect the control of gypsy moth on 30 000 ha, the eastern spruce budworm on 30 000 ha, and the jack pine budworm on 3 000 ha. Apparently there is no intention to discontinue the spraying beyond this year. Full resumption of spraying next year will obviously depend on the apparent need for the treatment and an economic recovery in the province.

- J. Hengiman, Silviculture Branch, Victoria.

PERSONNEL

Silviculture Branch

John Muir	Manager, Forest Health	Victoria	387-8740
Peter Hall	Forest Entomologist	Victoria	387-8742
John Henigman	Pesticide Specialist/ Vertebrate Pest Specialist	Victoria	387-8738
Val Fletcher	Forest Health Research Forester	Victoria	356-8763
Vacant	Forest Pathologist	Victoria	387-8739
Jeff Beale	Forest Health Officer	Victoria	387-8743
Pat Humphreys	Forest Health Technician	Victoria	387-8737
Mike Wyeth	Silviculturalist	Victoria	387-8922
Jacob Boateng	Brushing & Seeding Specialist	Victoria	387-8905
Nancy Densmore	Stand Tending Operations Forester	Victoria	387-8912
Don Summers	Manager, Nursery and Seed Culture Extension	Surrey	660-8855
Bev McEntire	Pest Management Biologist, Seed Production	Victoria	387-8938
Michelle Schmidt	Pest Management Biologist, Seed Production	Victoria	652-5413
Gwen Shrimpton	Nursery Pest Management Officer	Surrey	576-9161
Dave Trotter	Nursery Pest Control Officer	Surrey	576-9161

Cariboo Forest Region

Regional Staff

Al Randall	Silviculture Officer	Williams Lake	398-4399
Mark Hamm	Forest Health Forester	Williams Lake	398-4441
Leo Rankin	Forest Entomologist	Williams Lake	398-4439
Don Doidge	Forest Pathologist	Williams Lake	398-4442
Guy Newsome	Stand Tending Forester	Williams Lake	398-4400
Chris Easthope	Range Agrologist	Williams Lake	398-4396
Jane Perry	Extension Forester	Williams Lake	398-4717

District Staff

Charles Von Hahn	Resource Officer Silviculture	Quesnel	992-4457
Dennis Asher	Resource Officer Protection	Quesnel	992-4448
Gerry Chapman	Resource Officer Silviculture	Williams Lake	398-4691
Von Vickers	Forest Health Officer	Williams Lake	394-4324
Dave Greenley	Resource Officer Silviculture	Horsefly	620-3218
Tom Matzen	Resource Officer Protection	Horsefly	620-3221
Mark Seilis	Resource Officer Silviculture	100 Mile House	395-7800
Don Wright	Forest Health Officer	100 Mile House	395-7800
Doug Harris	Resource Officer Silviculture	Chilcotin	394-4215
Richard McKay	Resource Officer Protection	Chilcotin	394-4215
Scott Wessel	Forest Health Officer	Chilcotin	394-4215

Kamloops Forest Region

Region Staff

Lorraine MacLauchlan	Forest Entomologist	Kamloops	828-4177
David Calder	Forest Health Forester	Kamloops	371-3707
Ron Gray	Stand Tending Forester	Kamloops	828-4163
Phil Youwe	Range Resource Agrologist	Kamloops	828-4097

District Staff

Mike Hall	Resource Assistant	Clearwater	674-2265
Brent Olsen	Resource Officer-Silviculture	Kamloops	378-5832
Joan Demale	Resource Clerk-Silviculture	Kamloops	372-5832
Dave Piggin	Forest Health Officer	Kamloops	372-5832
Margo Hollinger	Forest Health Officer	Lillooet	256-7531
Tom Lacey	Resource Officer, Protection	Merritt	378-9311
Harry Spahan	Forest Health Officer	Merritt	378-9311
Jim Mottishaw	Forest Health Officer	Penticton	492-8721
Murray Henry	Forest Health Technician	Penticton	492-8721
Dave Procter	Resource Officer, Protection	Salmon Arm	832-7153
Jim Wright	Resource Assistant, Silviculture	Salmon Arm	832-7153
Eric Haupt	Forest Health Officer	Vernon	542-0264

Nelson Forest Region

Region Staff

Rick Stewart	Forest Health Forester	Nelson	354-6144
Don Norris	Forest Pathologist	Nelson	354-6143
Gerald Reichenback	Stand Tending Forester	Nelson	354-6280
Jack King	Range Officer	Nelson	354-6243

District Staff

Dan Reiben	Forest Health Officer	Arrow	365-2131
Ross Elliott	Forest Health Officer	Boundary	442-5411
Art Krane	Forest Health Officer	Cranbrook	426-3391
Rob Beugeling	Resource Officer	Golden	344-7500
Elizabeth Williams	Forest Health Technician	Golden	344-7500
Emile Begin	Forest Health Officer	Invermere	342-4200
Doug McMullin	Forest Health Officer	Kootenay Lake	825-4415
Archie McConnachie	Resource Officer - Protection	Revelstoke	837-7611
Peter Martiniuk	Forest Health Technician	Revelstoke	837-7691

Prince George Forest Region

Region Staff

Robert Hodgkinson	Forest Entomologist	Prince George	565-6122
Richard Reich	Forest Pathologist	Prince George	565-6143
Stuart Taylor	Forest Health Forester	Prince George	565-6123
Heather Dawson	Vegetation Mgmt. Forester	Prince George	565-4113
Les Herring	Stand Tending Forester	Prince George	565-6191
Ken Long	Range Officer	Prince George	565-6138
Bruce Johnson	Range Development Coord.	Prince George	565-6139

District Staff

Bob Richards	Resource Officer - Silviculture	Prince George	565-7100
Bruce Doerkson	Forest Health Technician	Prince George	565-7100
Barbara Koch	Forest Health Technician	Prince George	565-7156
Dale Cinnamon	Resource Officer - Protection	Robson Valley	569-3700
Lloyd VanDerMark	Resource Assistant - Protection	Robson Valley	569-3700
Greg Rawling	Resource Officer - Silviculture	Vanderhoof	567-6363
Dave Banham	Forest Health Technician	Vanderhoof	567-6363
Lance Mitchell	Resource Officer - Protection	Fort St. James	996-7131
Terry Corley	Resource Assistant - Protection	Fort St. James	996-7131
Andy Pakrastins	Resource Officer - Silviculture	Mackenzie	997-2200
Chris Broster	Forest Health Technician	Mackenzie	997-2200
Rick Grayston	Resource Officer - Protection	Dawson Creek	784-2350
John Bedell	Resource Officer - Protection	Fort St. John	787-3483
Bruce Young	Resource Officer - Protection	Fort Nelson	774-3936
Steve Matlashewski	Resource Assistant - Protection	Fort Nelson	774-3936

Prince Rupert Forest Region

Region Staff

Steve Schmidt	Protection Officer	Smithers	847-7475
Tim Ebata	Forest Entomologist	Smithers	847-7479
Stephan Zeglan	Forest Pathologist	Smithers	847-7478
Vacant	Forest Health Forester	Smithers	847-7477
Lou Tromp	Stand Tending Forester	Smithers	847-7514
Don Russell	Range Officer	Smithers	847-7443
Scott Harrison	Mammal Pest Specialist	Smithers	847-7717

District Staff:

Erwin MacDermid	Resource Officer-Protection	Bulkley	847-7555
Jane Lloyd-Smith	Resource Officer-Silviculture	Bulkley	847-7624
Bill Camenzind	Audit Forester	Bulkley	847-7628
Gordon Munroe	Resource Officer-Protection	Cassiar	771-4211
Larry Michalsen	Resource Officer-Silviculture	Cassiar	771-4211
Glen Buhr	District Silviculturalist	Cassiar	771-4211

Joe Katasonoff	Resource Officer-Protection	Kalum	638-3302
Kas Kopeo	Resource Assistant-Protection	Kalum	638-3290
Bob Wilson	Resource Officer-Silviculture	Kalum	638-3290
Rocky Chan	Incremental Forester	Kalum	638-3290
Rod Meredith	District Silviculturalist	Kalum	638-3290
Brian Atherton	Resource Officer-Protection	Kispiox	842-6581
Janice Bianco	Resource Officer-Silviculture	Kispiox	842-6581
Paul Hanna	District Silviculturalist	Kispiox	842-6581
Dave Nakashoji	Forest Health Technician	Morice	845-6200
Brian Simpson	Resource Officer-Protection	Morice	845-6200
Jim Highstead	Resource Assistant-Protection	Morice	845-6200
Debbie Janning-Stewart	Resource Officer-Silviculture	Morice	845-6213
Bill Jackson	Resource Officer-Protection	North Coast	627-0457
Mike Grainger	Resource Officer-Silviculture	North Coast	627-0462
Alex Gauld	Incremental Forester	North Coast	627-0475
Terry Chow	District Silviculturalist	North Coast	627-0475
Bill Davidson	Resource Officer-Protection	Lakes	692-2223
Wayne Martin	Resource Officer-Silviculture	Lakes	692-7515
Terry Thrower	Resource Officer - Silviculture/Protection	Lakes	692-7515

MEETINGS

Western Forest Insect Work Conference Meeting of Forest Health Managers. At the W.F.I.W.C. meeting in Penticton on March 2, I met with representatives of most of the forest health or forest pest management agencies. Attendees were:

- Iral Ragenovich, USDA Forest Service, Portland, Oregon
- G. Amman and R. Schmitz, USDA Forest Service, Utah
- L. Livingstone, Idaho Dept. of Lands, Idaho
- J. Byler, USDA Forest Service, Montana
- S. Kohler, Montana State
- Jed Deury, USDA Forest Service, Montana

This meeting went slowly as we did not have a firm agenda, so it was very difficult to identify issues of mutual interest. However we discussed the following:

- the status of the lodgepole pine terminal weevil assessment and management;
- the Douglas-fir tussock moth virus. There appears to be a large supply available although the production of more has been curtailed;
- Asian gypsy moth. Most of what was discussed is now public record;
- the availability of gypsy moth traps;

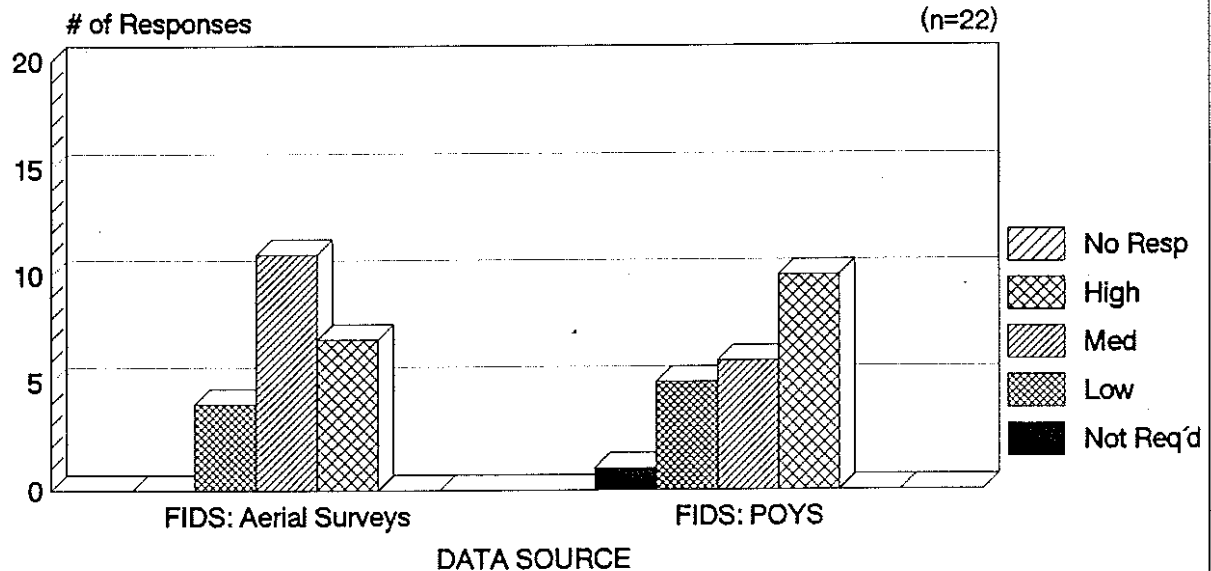
Also, J. Byler of the USDA Forest Service indicated that in Montana they are close to completing two publications on forest health and its implications to forest management. It would appear that they are taking a very ecological approach to forest health and plan to replace extensive areas of Douglas-fir with lodgepole pine to "re-balance the ecosystem". This initiative will contribute to overcoming the laminated root rot problems that they now have. Region 6 appears to be going in the same direction. We should have further discussions with both USDA Forest Service regions 1 and 6 in order to help us determine where to move our program over the next decade.

Anyone wishing to know more about the forest health initiatives underway in the U.S. Pacific Northwest should contact the forest health section in Victoria.

- J. Henigman, Silviculture Branch, Victoria.

FOREST HEALTH PROGRAM

The following FIDS Data are
of what relative value to the Program

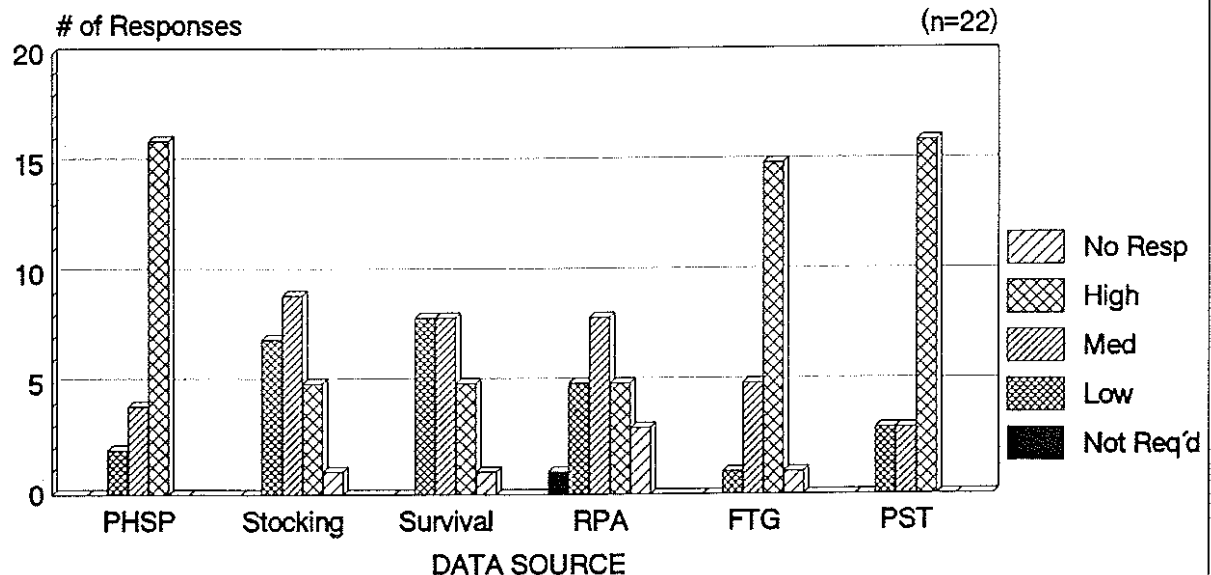


Forest Health Survey

FHHS01

FOREST HEALTH PROGRAM

The following SILVICULTURE SURVEYS are
of what relative value to the Program

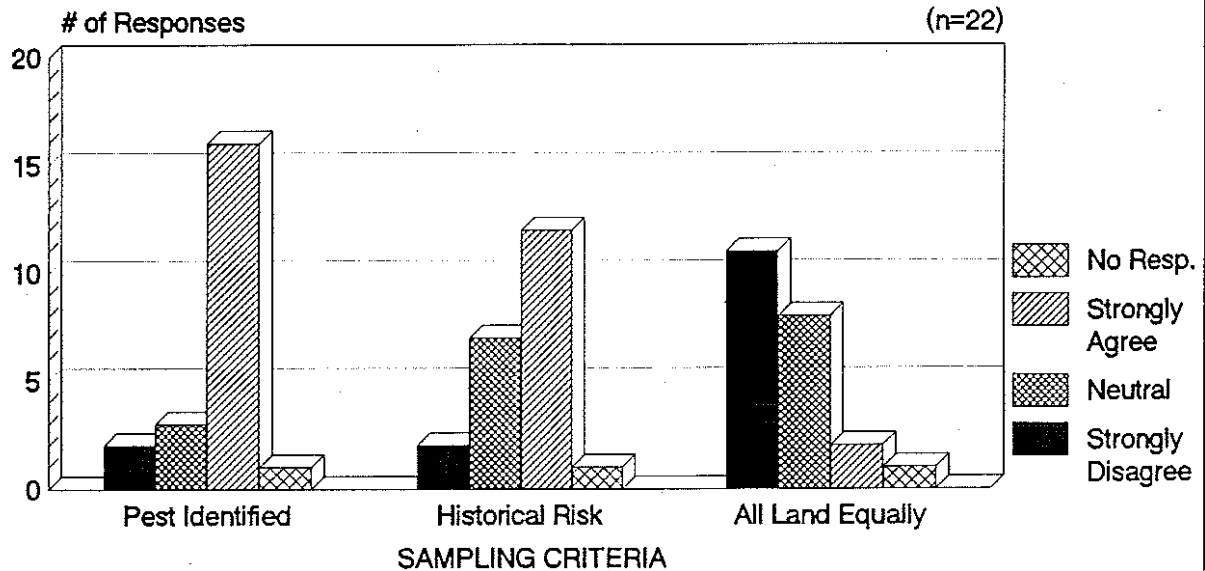


Forest Health Survey

FHHS02

FOREST HEALTH PROGRAM

GROUND SURVEYS should be used to
intensively sample in areas where:

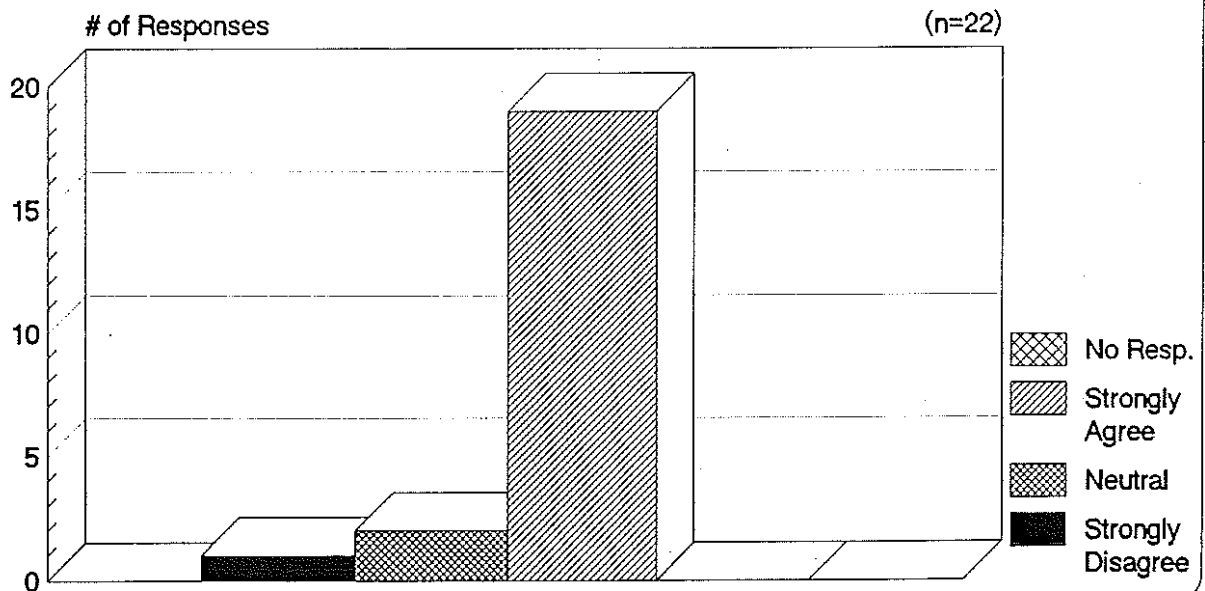


Forest Health Survey

FHHS15

FOREST HEALTH PROGRAM

Creation of a Standard F.H. Survey
Methodology would benefit the Program:

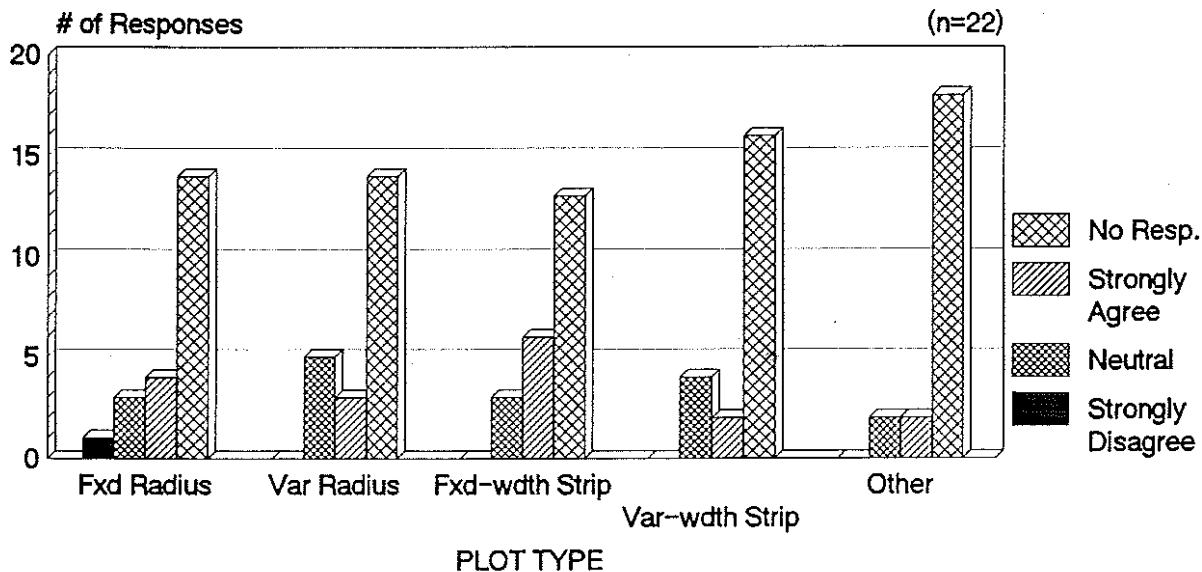


Forest Health Survey

FHHS16

FOREST HEALTH PROGRAM

The most appropriate type of Sample Plot to BALANCE COSTS & SAMPLING ERROR is:

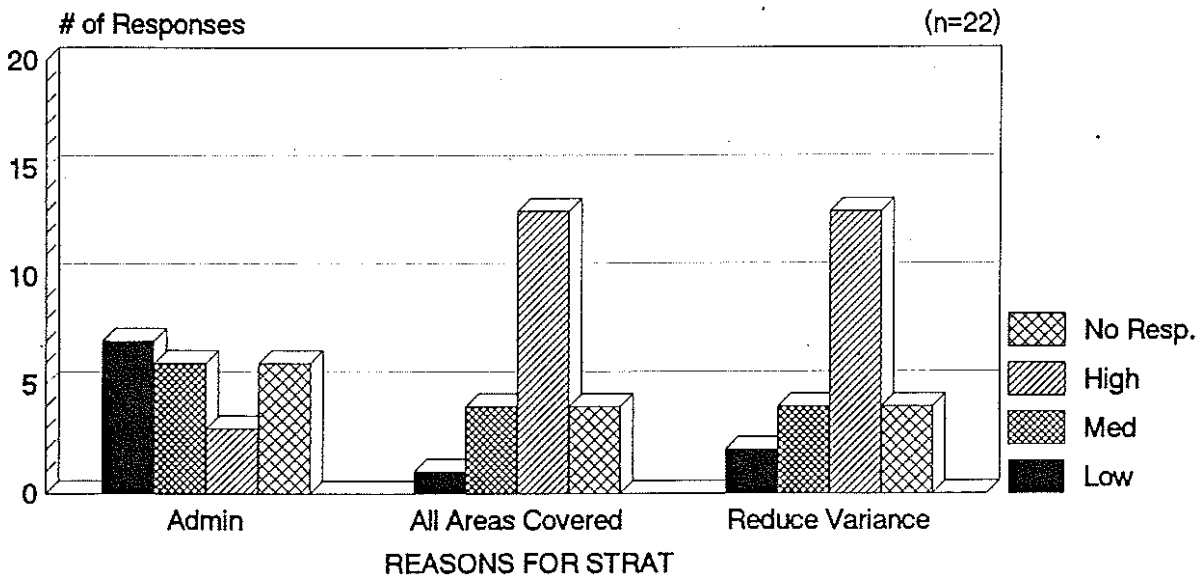


Forest Health Survey

FHHIS11

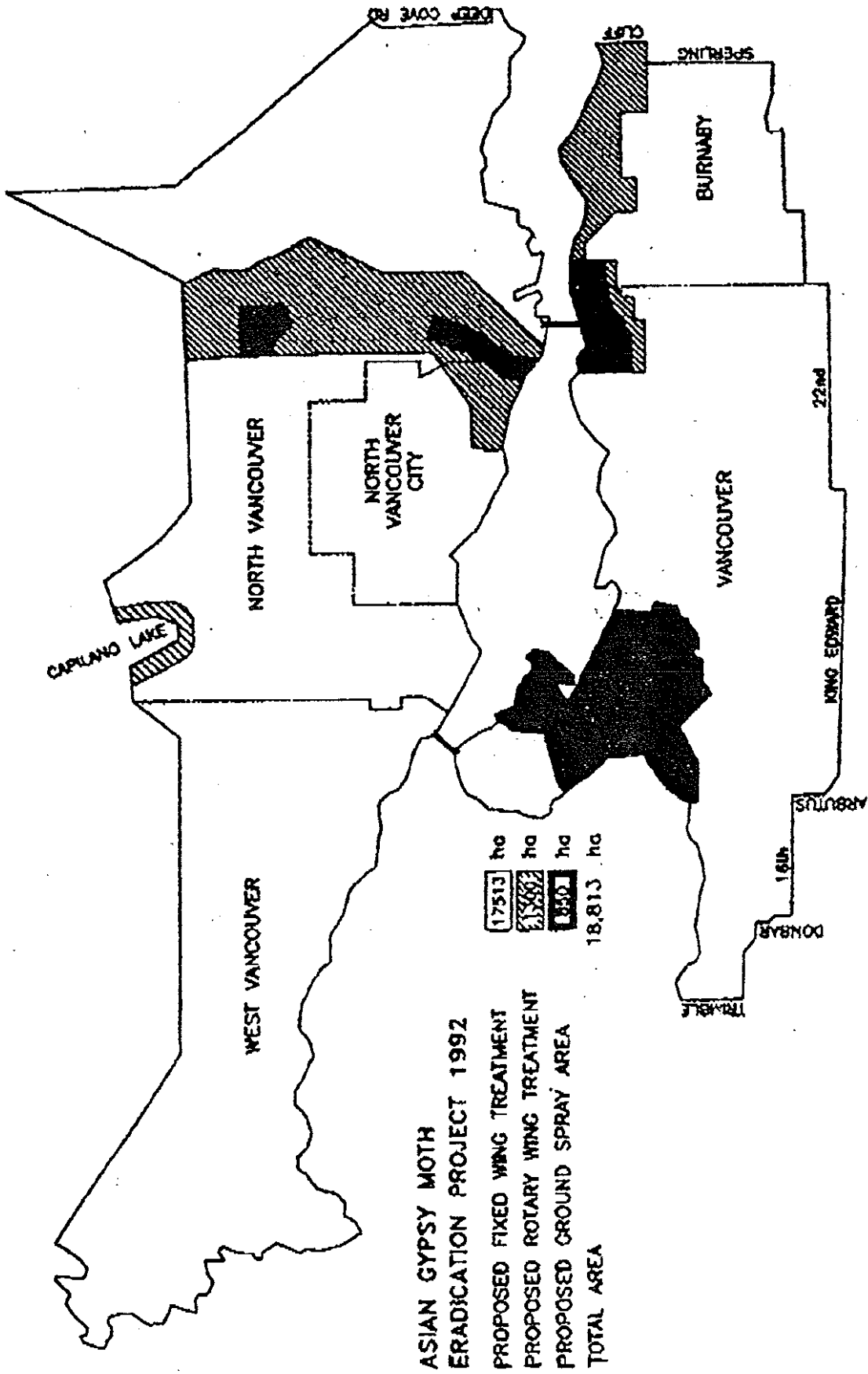
FOREST HEALTH PROGRAM

The Reasons and Relative Importance for STRATIFYING Samples are:

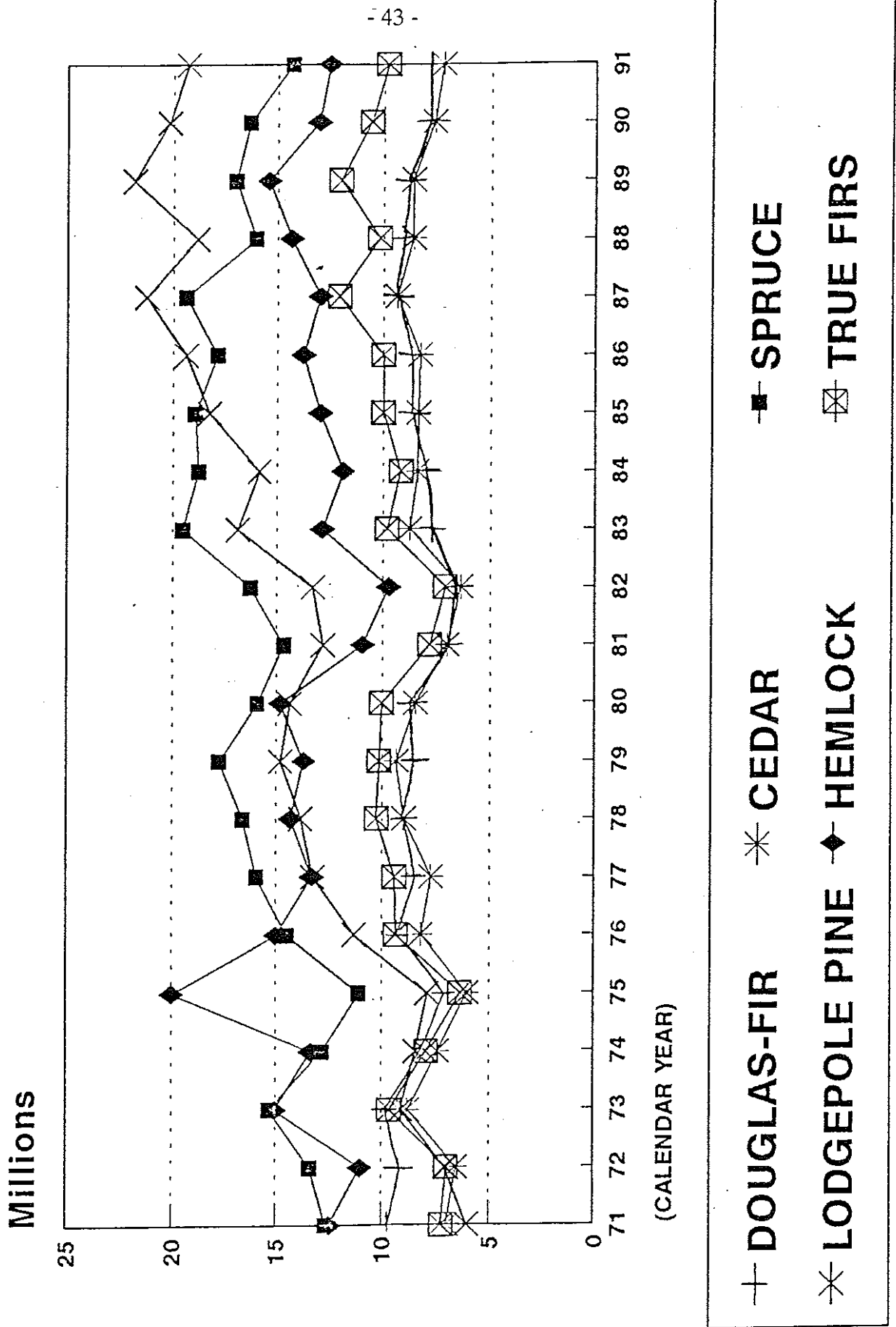


Forest Health Survey

FHHIS12



TRENDS IN SPECIES CUT IN BRITISH COLUMBIA 1971-1991



Source: BCFS

Publications and Reports

- Davis, G., S. Krannitz and M. Goldstein. 1992. Photographs of Phase II: A Reconnaissance Study of Roadside Tree Injury and Decline at 17 Sites in the interior British Columbia. British Columbia Ministry of Forests, Forest Science Section. Nelson, British Columbia.
- Duthie, M. Monosodium Acid Methanearsonate (MSMA) Monograph: Toxicology and other aspects of MSMA and related compounds. [1992]. British Columbia Ministry of Forests, Silviculture Branch. Victoria, British Columbia. In Press.
- Hart, D. and P.G. Comeau. 1992. Manual Brushing for Forest Vegetation Management in British Columbia: A Review of Current Knowledge and Information Needs. British Columbia Ministry of Forests, Forest Science Research Branch. Victoria, British Columbia.
- Linnell Nemec, A. F. Forest Health Surveys in British Columbia: A Review of Sampling Methodology. [1992]. International Statistics and Research Corporation. Brentwood Bay, British Columbia. In press.
- Morrison, D., H. Merler and D. Norris. Detection, Recognition and Managment of Armillaria and Phellinus Root Diseases in the Southern Interior of British Columbia. 1991. British Columbia Ministry of Forests, Research Branch. Victoria, British Columbia.
- Sterling Wood Group Inc. and W.F.S. Enterprises Ltd. 1992. Problem Analysis on the Extent of Control of Pest Problems in Forest Stands Managed with Different Silviculture Systems. British Columbia Ministry of Forests, Protection Branch. Victoria, British Columbia.
- Tyhee Forestry Consultants Ltd. 1992. Forest Health Information Update. British Columbia Ministry of Forests. Prince Rupert, British Columbia.