

As an introduction to this report to the Forest Health Committee of British Columbia, I am pleased to have the opportunity to briefly reflect and highlight some of our recent activities and accomplishments.

Development of Forest Practice Code guidebooks for forest health surveys, dwarf mistletoes, root diseases, bark beetles, defoliator insects and several other guidebooks in progress has been a major accomplishment by ministry staff. Comments I have heard so far have been very positive. Developing the guidelines revealed several areas where follow-up work is required, and many staff are busy with new studies and trials.

Two activities that have been identified and are being addressed to ensure successful implementation of the new code are skills training and decision-support aids. Several major contracts have been initiated, and we will be able to offer an increased level of support for district operational staff and licensees very soon.

Following a challenge to the committee last year by the chief forester, we have been busy determining how losses by insects and diseases are determined by various inventory and planning processes, and how improved determinations or estimates should be handled during analyses and reviews of timber supplies. Thanks to the co-operation and involvement of several ministry staff, we are confident that several improvements will be made in our planning, inventory and analytical methods such that in a few years we will be able to confidently estimate the extent of damage and losses to the forest resource.

Thanks to new funding opportunities by Forest Renewal B.C., we will see an increasing amount of forest health research, development and enhanced forest management activities in future years. This will address a major, long-term concern of the forest health committee, and provide more opportunity for the committee to influence research direction and priorities. The goal of most of the research and trials is to strengthen and substantiate the basis for improved forest management practices, including treatments for preventing damage and enhancing productivity of our resources.

- J. Muir, Silviculture Practices Branch, Victoria.

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FOREST HEALTH PROGRESS

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EDITOR'S NOTE

Forest Health Progress is a report to the Forest Health Committee of British Columbia on issues, proposals, projects and results by Ministry of Forests staff. Brief, informal and informative articles are welcome from all staff.

Contributions labeled with an appropriate subject heading should be submitted to regional forest health staff, or advisor, who will edit and forward them to Silviculture Practices Branch. Forest Health Progress is submitted to the spring (May) and winter (December) meetings of the Forest Health Committee.

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

EXECUTIVE SUMMARY

General projects and plans reported in this issue of **Forest Health Progress** include: unsalvaged pest losses (p. 4); and damage and activity codes for the integrated silviculture information system (p. 4). cone and seed pest management research and other activities (p. 5); opportunities in Forest Renewal B.C. for forest health research and development (p. 6);

Insect projects include assessment of Douglas-fir beetle at Garibaldi Provincial Park (p. 10); an outbreak of sawfly defoliation north of Campbell River on the mainland (p. 10); surveys of balsam woolly adelgid that might extend the quarantine zone (p. 11); detection and control programs for gypsy moth (p. 11); decision framework for gypsy moth projects (p. 12); a study of mountain pine beetle effects on lodgepole pine stands (p. 12); technical audit of bark beetle control activities at Williams Lake Forest District (p. 13); policy on management responsibilities for bark beetle control activities (p. 13); report of a Douglas-fir tussock moth and control program in the Kamloops Forest Region (p. 14); brochure of benefits and costs of managing mountain pine beetle (p. 14); beetle management in the Morice Forest District (p. 14); hazard rating for white pine weevil in the Nelson Forest Region (p. 15); determination of flight periods of western pine beetle near Castlegar (p. 15); assessment of red turpentine infestation of pruned and spaced lodgepole pine in the Kamloops Forest District (p. 15); study of effects of logging on carabid beetles near Nelson (p. 15); standardized bark beetle caused by western balsam bark beetle (p. 16); dendrochronology of subalpine fir management data and reports (p. 17); and testing of confidence intervals for spruce beetle probes (p. 17).

Disease projects include trial of tomentosus root rot control methods in the Bulkley Forest District (p. 19); pruning trial of lodgepole pine infected with stem rusts at Lakes Forest District (p. 20); assessment of needle cast of lodgepole pine in the Cariboo Forest Region (p. 22); trial of chainsaw- and chemical spacing of Douglas-fir and laminated root rot (p. 21); susceptibility of western hemlock to laminated root rot in the Sunshine Forest District (p. 22); improvement of root disease survey methods (p. 22); and laminated root rot surveys and treatments in the Campbell River Forest District (p. 22).

- J. Muir, Silviculture Practices Branch, Victoria.

FOREST HEALTH - GENERAL

Unsalvaged Pest Losses Project Update: Based on a request from the Chief Forester, we are attempting to resolve how unsalvaged pest damage losses can be regularly and accurately calculated for timber supply reviews of Timber Supply Areas and Tree Farm Licenses. In particular, the Ministry's timber supply review pest loss estimations and the Canadian Forest Service Forest Insect and Disease Survey estimations will be reconciled. As an example, we have chosen to compare the current methods of estimating unsalvaged pest losses against a more direct measurement of unsalvaged pest losses within the Invermere Timber Supply Area. It is clear that the more careful assessment of damage shows much greater losses than would normally have been estimated. A similar project being conducted by Canadian Forest Service in the Prince George Region is hinting at the same conclusion.

In the near future two complementary reports, ours and one from the CFS, will describe the types of pest losses that are currently not being recorded and included in timber supply reviews. We will outline a method for districts to follow to identify, record and calculate unsalvaged pest losses. It is expected that within a few years of data collection this standardised approach for all districts will achieve the needed level of accuracy to the program.

As part of our report we intend to clarify definitions associated with unsalvaged pest loss calculations. We also intend to review the issue of what portion of pest damage is and is not reflected in the Ministry's timber inventory.

If you wish more information on this project or to receive copies of the reports once they are completed please contact the author.

- J.F. Henigman, Silviculture Practices Branch, Victoria.

Pest Codes and Forest Health Activity Codes to be Formally Adopted by ISIS in March: As part of the merging of forest health with the greater silviculture program, new forest health information codes will officially be added to the Integrated Silviculture Information System (ISIS) in March, 1996.

The Damage Agent and Condition Codes (Pest Codes) developed under the direction of Jeff Beale, have been used by some staff for almost a year now. They are on the most recent edition of the silviculture surveyors' field cards currently in use. These two or three letter codes standardise how specific pests must be identified on field survey cards. Using this code system the mountain pine beetle code is 'IBM', which is 'I' for insect, 'B' for beetle and 'M' for mountain, and armillaria root disease is 'DRA' which is 'D' for disease, 'R' for root disease and 'A' for armillaria. As planned this information will now be recorded in ISIS which will be a welcomed and somewhat overdue accomplishment.

The new forest health activity codes will alter how ISIS stores survey and treatment information. Every field activity involving forest health will be recorded in ISIS by opening number. Consistent with the existing ISIS format there are four levels of detail to the information stored in ISIS including the base, technique, method and objective. The basic purpose of the survey or treatment is called a 'base', and the primary forest health base is 'pest

control', however there will also be forest health information stored in bases such as 'denudation', 'juvenile spacing', 'planting', 'surveys' and 'site preparation', among others. A refinement of the base is a 'technique' such as 'biological' or 'burn' within the base 'pest control'. The most refined level of detail is the 'method' such as 'pile and burn' within the technique 'burn'. The fourth level in the system is the 'objective' of the treatment or survey and it uses the pest codes described above. With these activity codes it possible to have reports of work completed or pending quickly created.

The new ISIS activity codes will help forest health be scheduled and conducted along with other silviculture treatments. However, bark beetle surveys and treatments will not be part of this system because they cannot be tracked using silviculture opening numbers. In order to track bark beetle operations a separate standardised data base is now be created.

For more information on the ISIS forest health activity codes and pest codes please contact the author.

- J.F. Henigman, Silviculture Practices Branch, Victoria.

Seed Pest Management Report, Fall 1995. The Seed Pest Management group of the BC Ministry of Forests (Silviculture Practices Branch) has grown by one new biologist. As of January 1996, Dr. Ward Strong joined Bev McEntire and Michelle Hall in working under the supervision of Robb Bennett. Ward is handling interior operations out of the Kalamalka Seed Orchard facility; Bev and Michelle are looking after Coastal operations from the Saanich Seed Orchard. All members of the group continue to work together on the development of new and continuing cone and seed pest management projects.

Ward has two graduate degrees in entomology: an M.Sc. earned under John Borden's supervision at Simon Fraser University and a PhD. from Oregon State University under Brian Croft. His research has produced successful biological control programs for thrips on greenhouse cucumbers and spider mites on hops. Additionally, he has owned and/or managed several pest management companies including MonAgro Consulting (Langley, BC) and the Pro-Tect Department of the East Chilliwack Agricultural Co-op (Abbotsford).

Cone and seed insect research and other projects showing significant progress in 1995 include:

Fir coneworm, *Dioryctria abietivorella*. An identification guide for BC *Dioryctria* species will be submitted for publication review in late December. It will include illustrations, descriptions, natural history information, and a paired couplet key to species based on morphological characters. This has been prepared primarily by UVic Biology Co-op student Stephanie Sopow during work terms with the Seed Pest Management Group (with additional critical input from Agriculture Canada entomologists). Bev McEntire will be defending her MPM thesis on pheromone monitoring of fir coneworm early in the New Year.

Sequoia pitch moth, *Synanthedon sequoiae*. Sequoia pitch moth caterpillars were successfully reared to adults at Simon Fraser University and tested for pheromone activity. Candidate pheromone blends were prepared in time for successful testing against naturally emerging moths at two lodgepole pine sites in the interior. This trial will be continued in 1996 and expanded to include another species (probably *S. novaroenisis*) which has recently become a problem in Sitka and Engelmann spruce orchards on the coast. Pitch moth research at the University of

Northern BC is concentrating on examining correlations between lodgepole pine seed orchard clone, stress level, and susceptibility to "pitch moths" (*Synanthedon* spp. as well as *Dioryctria* spp.), stalactiform rust, and *Hylobius* root collar weevils.

Douglas-fir cone gall midge, *Contarinia oregonensis*. After successfully demonstrating the presence of a female cone gall midge sex pheromone attractant to males, researchers at Simon University have identified the probable chemical involved. Field trials planned for spring 1996 will attempt to pinpoint the active isomeric configuration of the pheromone.

Spiral spruce cone borer, *Strobilomyia neanthracinea*. Studies undertaken in the spring indicated that at least two pheromones are used by female cone borer flies to deter other females from ovipositing on already utilized cones: one is associated with the actual oviposition process (i.e. is laid down with the egg by the ovipositor) and the other is applied to the cone surface by the fly mouthparts through cone licking behavior. Further efforts in 1996 will be directed at isolating and characterizing these pheromones. Spruce conelet volatiles were successfully collected from flowering spruce trees this spring. Volatiles are being characterized and future work will concentrate on identifying compounds attractive to female cone borers. A successful rearing protocol for cone borers is close to being realized. The inability to successfully rear cone borers in the lab has been a stumbling block to scientists at the CFS labs in Sault Ste Marie and Fredericton and at the University of New Brunswick.

Spruce seed moth, *Cydia strobilella*. After seed extraction, empty cones are often shipped far and wide across the continent and abroad as ornaments and in Christmas arrangements. In BC, two species of seed moths overwinter as caterpillars in the axis of spruce and ponderosa pine cones and are potentially being spread by this practice. We are in the process of examining the survival rate of *Cydia strobilella* in orchard cones after the cone collection and seed extraction process.

Seed orchard beneficial insects. Michelle Hall's field guide to orchard beneficials was presented at her MPM thesis defense in November, 1995. Copies of this guide will be available for distribution to seed orchard staff and other interested persons in 1996. The guide is formatted as a collection of two page presentations for specific insects with a page of natural history and identification information faced with a page of colour photographs. Additionally it has introductory chapters on identification, monitoring, and importance of beneficial organisms in seed orchards.

- R. Bennett, Silviculture Practices Branch, Victoria.

FRBC Opportunities for Forest Health: Forest Renewal Plan funding priorities have included numerous opportunities for the advancement of forest health research, operational trials, surveys and treatments. The avenues for application varies if you are a Provincial government agency (MOF or MELP), Industry, or other (i.e. CFS, university, First Nations, Community organisation or consultants) proponent. The proposal submission and approval process is complicated but the following will hopefully help to explain it. Specific details are described in FRBC's 1996 *Handbook for Land-based Programs* (in press) and *Research Program Funding Application Handbook* (November, 1995).

1. Ministry of Forests and Ministry of Environment, Lands and Parks Proponents

Enhanced Forestry and Resource Inventory Proposals

Applications (3 copies) from MOF and MELP District or Regional offices are submitted to the nearest FRBC Regional office. Regional Forestry Sector Initiatives Managers - FSIMs (MOF) or Planning and Assessment Managers (MELP) may request that districts and regions notify them of all proposals which will be submitted. The FRBC office will send copies of all forest health proposals to the FSIMs to arrange for technical review.

Enhanced Forestry Proposals (EFP) from districts will be technically reviewed by the region. Inventory proposals will be forwarded to the appropriate technical reviewer in Region or Headquarters. Proposals will be ranked with proposals from other proponents in the draft district and region Business Plans, which the FSIM will submit to the FRBC Regional Director for approval.

Research Proposals

Regional Forestry Sector Initiatives Managers (FSIMs) may request that districts and regions notify them of all proposals which will be submitted. Forest Health proposals from Branches will be coordinated by Tim Ebata, Silviculture Practices Branch.

If the proposal is defined as research, then it will first be screened by FRBC staff for:

- Correspondance with FRBC's strategic priorities (forest renewal, protect and restore the environment, create more jobs per tree cut, forest worker training, strengthen forest based communities)
- Technical merit
- Expected impact
- Partnerships
- Proponent competence
- Cost-effectiveness

If the proposal passes all of the criteria, then it is forwarded to the Science Council of B.C. who will assign each proposal to a specific technical review committee for scrutiny by topic experts (e.g. members from the tree improvement council, growth and yield steering committee, and forest health committee). The review process may take several months and is expected to be finalized by April, 1996.

For operational trials (to be defined by FRBC) it is expected that FRBC's Land-based program handbook will allow proposals to be submitted to the enhanced forestry program rather than through the research review process. Judging from the interest generated to date, most Forest Health activities seeking FRBC support will fall into this category.

2. Non-MOF and MELP Proponents

Enhanced Forestry and Resource Inventory Proposals

Enhanced forestry and resource inventory proposals are submitted directly to the nearest Regional FRBC office. A technical review is done by the MOF (district staff for EFP and Regional and Headquarters technical staff for inventory). Proposals will be ranked and a draft business plan prepared and submitted by the FSIM to FRBC for approval.

Non-forest industry proponents are encouraged to participate as partners with agencies which have expertise in the resource planning and management requirements inherent in land-based programs (i.e. forest industry, MOF, MELP). Contact FRBC for more information on creating partnerships. FRBC will not normally accept proposals for funding directly from forest contractors or consultants. Such businesses are expected to become sub-contractors under a lead project proponent.

Research Proposals

Proposals are submitted directly to FRBC offices and the review and ranking process is identical to that described for MOF and MELP research proposals.

3. Suitable projects

Following is a list of forest health activities that could be funded by FRBC under the Land-based programs (Enhanced Forestry and Resource Inventory) and Lands and Resources Research funding envelopes. This list is simply a guide to assist applicants in identifying the type of forest health project that could be eligible. Application for funding must follow the process described above.

General Suitability Criteria

- "enhanced or incremental forest health activities including felling and burning for bark beetle control" (NB: only where it is not currently an obligation)
- "surveys, prescriptions and layout associated with the above." *From the draft 1996 handbook for land-based programs.*
- No off-loading of existing responsibilities - legislated or contractual (licence conditions) unless it is required by the FPC as a Resource Inventory for higher level planning (See Operational Planning Reg. 17(6)(e) & 29) (e.g. hazard and risk rating for bark beetles, weevils, defoliators, root disease).
- Incremental to existing programs (not currently being done operationally).
- Developmental; assisting the development of new surveys and management techniques (Nb: "Operational trials" will probably be submitted as an enhanced forestry activity if the trial is testing or developing an activity that is already considered a funding priority).
- Currently FRBC appears to favour investments that will provide returns in the future, not immediately (i.e. harvesting, commercial thinning). Unresolved issues of clarifying FRBC's role in revenue generating ventures and the Ministry's position on charging salvaged volumes to licensee AACs do not favour this activity becoming acceptable.

Potential Projects

Entomology

- Stump peeling to mop-up bark beetle infestations in brood removal harvesting sites

- Whole log peeling and the development of a debarking tool (operational trials portion only)
- Pruning older spruce plantations that suffered spruce weevil attacks to improve tree form
- Insecticide injection of spruce for weevil control (operational trial)
- Underburning in the IDF for ecosystem amelioration/forest health (operational/research trial)
- Outplanting genetically improved, weevil resistant stock or emblings at an operational scale combined with different management strategies (i.e. brush, varying densities, varying species, varying % resistant vs. susceptible stock, etc.)
- Wood product protection research (i.e. ambrosia beetles, woodborers, staining, etc.)

Pathology

- Root disease survey method development and implementation (training)
- Push-over logging training and extension
- Pop-up spacing and bridge tree removal and post-treatment assessments for soil disturbance and site degradation (Growth and Yield installations)
- Post-free-growing white pine pruning (additional lifts) and canker excising
- Pruning larch seed trees for dwarf mistletoe control
- An update survey of free-growing stands to document species and stocking shifts due to root rot
- White pine blister rust resistance studies

General

- Hazard and risk assessments for all major forest health factors particularly:
 - MPB (Shore & Safranyik method) and other major bark beetles
 - Root diseases
 - Stem rusts
 - Ground truthing spruce weevil climatic based hazard rating
 - Porcupine
 - Squirrels
 - Other mammals
 - Frost and other abiotics
- Any work that improves estimates of pest impacts on growth and yield (Operational Adjustment Factors) and Timber Supply Analysis
- Decision support tools that will aid silviculturalists in anticipating impacts of pests and how they may be affected by silvicultural treatments
- Any work that can improve alternative silviculture system prescriptions when pests are present
- Training and extension for all of the above initiatives (e.g. computer based training tools)
- Management of exotic pests in forest ecosystems

For more information on any FRBC Forest Health activity, contact your local FSIM, Regional FRBC office, Forest Health Specialist or the undersigned.

- T. Ebata, Silviculture Practices Branch, Victoria.

FOREST INSECTS

Douglas-fir beetle in and around Garibaldi Provincial Park. In the past few months, concerns have been expressed regarding Douglas-fir beetle (DFB) in and around Garibaldi Provincial Park. Canfor has been logging at the south end of the park and along the east side of Glacier Lake. Douglas-fir beetle has been killing trees in several spots along the west side of the lake within the park boundaries. Concerns seem to be over if the logging has been contributing to the damage in the park and if treatment of park infestations are necessary to protect adjacent timber producing lands. Accordingly, a field trip was organized for August 29 to inspect the area and make an assessment. The field trip included Jeff Fournier (Squamish District), Kerry Joy (MELP-Parks Branch), and Don Heppner (Vancouver Region).

Reviews of FIDS maps at Squamish District indicated that Douglas-fir beetle has been active in the Glacier Lake area for several years. Mortality seems to have begun in about 1992 or 1993 and has persisted since. An aerial recce of the area showed several spots on both sides of the lake - Canfor has been removing patches of blowdown. The logging appears to be fairly clean with only minimal debris left that would harbour further beetle populations.

There was apparently a flood and storm in the fall of 1991 that caused substantial tree damage and windthrow. This could well have been the "event" which triggered the beetle population. There has also been further blowdown in the area which would sustain a large population of beetles. Examination of the killed patches of trees indicates that the spots seem to have arisen at about the same time and have been active for several consecutive years. This pattern is repeated on the east side of the lake although somewhat obscured because of logging. Also, there may be higher beetle activity on the west side because of a slightly warmer microclimate and, perhaps, higher stress levels. In any event, the DFB patches seem to have arisen throughout susceptible forest types from natural factors - logging activity does not seem to be to blame. Further, there is little point in treating infestation spots in the park as they are probably not contributing to mortality on the other side of the lake.

Discussion on the field trip seemed to confirm the above and all parties are now fairly comfortable with the situation. All are in agreement as to the source and progress of the beetle. Kerry Joy will be confirming this to Jeff Fournier - no further action is necessary in this matter.

Sawfly Outbreak in Phillips River. Approximately 200 hectares of old growth amabilis fir and western hemlock forest near the head of the eastern fork of the Phillips River (on the mainland, due north of Campbell River) were recently detected as being defoliated by a conifer sawfly (*Neodiprion* spp.). The amabilis fir were defoliated more severely than the western hemlock. It appears that most of the defoliation occurred this past summer. Although many of the amabilis fir were severely defoliated, most of the buds are still alive and should flush next spring.

This outbreak seems to be very similar to a sawfly outbreak that occurred over 4,400 ha near Sayward in 1978 and 1979 (we are assuming it is the same species). In the Sayward outbreak, most trees survived the defoliation, however, because they were stressed as a result of the defoliation, many were subsequently attacked and killed by bark beetles (silver fir beetle and fir root bark beetle, *Pseudohylesinus* spp.). This mortality required a substantial salvage operation. Characteristics of a sawfly outbreak in amabilis fir/western hemlock forests

include: a rapid increase and decline in the sawfly population; a short outbreak duration (usually two years of significant defoliation); population collapse during the late instar larvae stages that is probably due to a viral disease; severe defoliation of amabilis fir; feeding occurring primarily on older needles leaving many of the current needles and buds; low initial attacks of bark beetles (*Pseudohylesinus* spp.) that subsequently seem to have poor survival; increasing bark beetle population with subsequent years of defoliation that often results in the death of a substantial portion of the defoliated trees.

At this point, very few beetles have been detected; the trees still seem to be healthy enough to ward off the beetles. However, another year of defoliation is likely and if this occurs, the trees will be more stressed and increased beetle activity is probable. If this outbreak follows the same course as the Sayward outbreak, there should be another year of defoliation (1996), followed by increased bark beetle infestations the following year (1997).

There are a number of chemical insecticides that will control sawfly (unfortunately, B.t. is not effective on sawfly). However, because of high fisheries and wildlife values in the Phillips River drainage and plans to harvest the affected stands within the next several years, the use of insecticides is not recommended.

This area is within MacMillan Bloedel's TFL 39 and the affected stands are within the development plan for the area. Road access to the area will take two years to construct, which will coincide with the need to salvage if required. The course of this infestation will be monitored over the next several years.

- D. Heppner, Vancouver Forest Region, Nanaimo.

Balsam woolly adelgid survey. Several positive finds of balsam woolly adelgid (BWA) have occurred in the past few years in areas outside of the quarantine zone necessitating modifications to the quarantine zone boundaries and the regulations on movement of *Abies* material throughout the province. A survey was undertaken in the spring of 1995 to determine the current range of the balsam woolly adelgid in areas currently outside of the established quarantine zone. Seventy-seven stands of *Abies* were sampled on Vancouver Island between Port Alberni and Campbell River.

These samples were evaluated for the presence of BWA; four of the samples showed positive for the presence of BWA. Additional positive finds of BWA have been located to the northeast of the existing quarantine zone and to the east. A positive sample was found on the east side of the Fraser River near Boston Bar for the first time. These new examples of the expanded range of BWA indicate natural dispersal from previously infested areas on southern Vancouver Island and the lower mainland. Long range dispersal as a result of artificial transport of infested material has not been demonstrated, likely due to the effectiveness of the quarantine regulations. However, the regulations will be re-evaluated in light of the new findings and studies that indicate that BWA can infest and be transported on one and two year old seedlings. Further surveys in areas outside of the existing known range are also planned.

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

Gypsy moth. Asian strain - Six male moths of the Asian strain of gypsy moth were found in pheromone monitoring traps in 1994. Two moths were found in a single trap in the port area

of Nanaimo; 3 moths were found in widely separated traps in Surrey and a single moth was trapped in Langley. No eradication spray program was carried out in 1995 in these areas because of a lack of information and justification. Intensive and extensive delimitation trapping was conducted in the summer of 1995 in these areas to determine if a population exists and to precisely locate the epicentre. Additional financial assistance for this program was given to Agriculture and AgriFood Canada by the United States Department of Agriculture, Forest Service. Only a single Asian strain gypsy moth adult was trapped during this survey near Langley. Trap catches in Surrey and Nanaimo were negative. This situation will be reviewed by the gypsy moth committee to determine the best course of action for 1996.

North American strain -An eradication program utilizing aerial application of Btk was undertaken in and around Canadian Forces Base, Chilliwack in the spring of 1995. Trapping was continued throughout the province in 1995 with Ministry of Forests support. As of the end of October, 1995, a total of 36 adult male North American strain moths have been trapped throughout the province. Most of these were single trap catches in widely scattered locations. Only 4 males were captured in Hope, where trap catches were higher in 1994. A total of 12 males were trapped in New Westminster including 8 males found in a single trap. These results will also be reviewed by the gypsy moth committee to determine the most appropriate course of action for 1996.

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

Gypsy moth decision matrix. Decisions on the most appropriate approach to new introductions of gypsy moth in British Columbia have traditionally been based on a consensus of opinion of members of the gypsy moth committee of the Plant Protection Advisory Council. While these decisions have been consistent over the years and have only considered the biological and technical ramifications of each positive find, no consistent documentation or "paper trail" of the various decisions has been developed. This applies particularly to treatment decisions regarding low levels of moth catches (one or two per trap) of the Asian strain.

The application of treatment policies appears to vary between Canada and the United States. Therefore, a decision framework is being developed that is expected to both ensure decisions are consistent and provide the rationale behind such decisions. Factors including the degree of certainty of identification, geographic and temporal trap catch patterns, availability of host material and others will be included in the evaluation process. The intent is to methodically determine the best course of action and be able to justify the recommendation to other agencies and the public.

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

Bark beetle impact study. Questions have been raised regarding the eventual fate of stands infested by mountain pine beetle. It is necessary to know the composition of the residual stand after the infestation has subsided to determine the need for rehabilitation or to estimate the regeneration delay or remaining volume in the stand for harvest planning. Further, an evaluation of the residual volume after an infestation will provide a means to quantify the hazard rating system now in place.

The first phase of a study to determine final beetle impacts was carried out in the Penticton and Vernon Forest Districts in the spring of 1995. A total of 781 plots were established in 39 stands where mountain pine beetle had completed the infestation cycle. Measurements on the plots included species and diameter distribution before and after the outbreak and other mensurational data. Plots were identified down to biogeoclimatic sub-zone as stand response was expected to vary.

The second phase of the study was carried out during the fall of 1995 in the same stands as were sampled in phase I. Sampling was as a modified pre-stand tending survey. Information collected from fixed radius plots included the following:

- all species <7.5 cm diameter
- for preferred species only:
 - i) well spaced stems/ha (post free growing, etc.)
 - ii) any significant noted insects or diseases
 - iii) crown closure by layer (if layered understory)
 - iv) height classified by: <0.5m; 0.5 - 1.0m; 1.0 - 1.5m; 1.5 - 2m; 2.0 - 2.5m; or > 2.5 m
- at each polygon, the following was assessed:
 - i) snowpress potential (of preferred species only)
 - ii) average height range (for site prep purposes)
 - iii) soil
 - iv) slope classified by: <30%; 30 - 50%; or, >50%
 - v) competing vegetation (species and % cover)

These data will be combined with data obtained in phase I and analysed. A preliminary report is anticipated by the spring of 1996 with a final report to follow.

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

Cariboo Region/Williams Lake District Technical Audit. A comprehensive technical audit of the bark beetle program in the Williams Lake Forest District and the Cariboo Forest Region was requested by the district and region. An audit team comprised of a District Manger, a Regional Timber Officer, and an entomologist was assembled; audit interviews with region and district staff, licensees, Ministry of Environment, Lands and Parks, and other stakeholders and interested individuals were carried out during the week of May 7, 1995. The scope of the audit was similar to previous bark beetle audits conducted in the Penticton and Boundary Forest Districts. The audit report has been completed and submitted to the Regional Manger, the District Manager, and the Ministry Executive.

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

Bark beetle responsibility matrix. A matrix assigning responsibilities for licensees and the Ministry to undertake various activities to manage bark beetles under a variety of land tenures was prepared as a draft Ministry policy and circulated for comment in the spring. The draft was also reviewed by Legal Services Branch. The result of the review was that the draft policy was not valid for the following reasons:

1. the sections of the Forest Act cited as the authority for the policy no longer exist and have been replaced or incorporated into the Forest Practices Code of British Columbia Act, regulations, and guidebooks;
2. the definition of the land area where a licensee was responsible for activity costs was imprecise and, under the FPC is now considered when establishing the areas under a development plan.

A policy will be pursued, however, recommending the scope of the area to be considered under a forest development plan.

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

Douglas-fir tussock moth program write-up. The most recent outbreak of Douglas-fir tussock moth has declined and no treatments with nuclear polyhedrosis virus or other methods were undertaken in 1995. The extent and amount of damage incurred in this outbreak was very small, due to the pheromone detection program which detected infestations prior to visible defoliation followed by the early application of the virus which aborted the outbreak in treated sites. It was not necessary to treat any single site more than once. A final report and publication is being prepared which will outline the program components, present various survey findings, present final results, and discuss this successful application of an integrated pest management system.

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

Mountain pine beetle benefit/cost analysis brochure. An evaluation of the benefits and costs of managing mountain pine beetle was carried out under contract to the Forest Service in 1992/93. This analysis concluded that management of mountain pine beetle resulted in considerable benefits to a variety of stakeholders. The benefit/cost document, while available, is very technical and somewhat difficult to read. Therefore, a brochure which summarizes the report findings is being developed this year. This brochure is directed primarily at an audience with some technical background and will be used as part of information packages on beetle management and forest health activities.

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

Mountain Pine Beetle Salvage in the Morice Forest District. As usual, Mountain Pine Beetle Salvage is still getting the most attention in the Morice Forest District. This year during our overview flights, over 2,200 new infestation centres were GPS fixed. Through combined efforts between the MOF and major licensees, we are salvaging and constructing road into all of the infestation centres that are on conventional ground and are not constrained by other resource values. On unconventional ground and contentious areas (i.e. wildlife corridors, leavestrips and river corridors) we are conducting single tree treatment. This summer we treated 17,621 infected trees with MSMA. If we receive additional funding we plan on treating 6,000 trees with fall and burn. Without additional funding, I estimate only being able to treat 2,000 trees.

The entire district has been hazard rated for Mountain Pine, Spruce and Balsam Bark Beetles. I am also updating the district's forest health plan, which will provide guidance to ourselves and the major licensees on future development.

As far as other pests, we are still updating their incidence on ISIS and opening files as they are detected through silviculture surveys.

- T. Bresser, Morice Forest District, Houston

Hazard Rating for Spruce Weevil, *Pissodes strobi*, in Nelson Forest Region.

Spruce accounts for approximately 50 % of planting effort in the Nelson Forest Region but there has been little systematic assessment of current or potential problems with spruce weevil. Such an assessment is now considered a priority in the Nelson Forest Region, in view of the problems encountered in other regions of the province, and the fact that Canadian Forest Service Forest Insect and Disease Survey have recently indicated sharp increases in weevil populations. A contract to assess weevil hazard and activity in the Nelson Forest Region was carried out. The final report is not complete, but the surveys indicated that Nelson Region has about 46,000 ha of spruce plantations over 5 years of age in high risk ecosystems. It is expected that the full report will be available by January, 1996.

- A.J. Stock, Nelson Forest Region, Nelson.

Flight periods of the western pine beetle. Flight periods of the western pine beetle (*Dendroctonus brevicomis*) were monitored from 28 April to 30 September 1995 in Deer Park, Arrow District, where an outbreak has been present for the past 3 years. Lindgren funnel traps and Theysohn traps were used in a test to compare efficiency and utility of the two types of traps for this task. Approximately 100,000 beetles were trapped, with peak flight in the last week of June, but with significant flight occurring from mid-June to the end of August. Theysohn traps caught slightly more beetles than the Lindgren funnel traps.

- A.J. Stock, Nelson Forest Region, Nelson.

Logging and Carabid biodiversity, West Arm Demonstration Forest. A biodiversity study to monitor changes in the Carabid beetle population which may result from harvesting was installed in the West Arm Demonstration Forest near Nelson, B.C., in 1994. Installation was in conjunction with a small block seed-tree harvesting trial in the Interior Cedar Hemlock biogeoclimatic zone, conducted by research staff of the Forest Science Section in the Nelson Region. Treatments in the 4 replicate experiment are 0.5, 1.0, and 1.5 ha cut block sizes. First year (1994) results of pitfall trapping for Carabids showed that 9 species were present prior to logging on the site. Logging commenced in the winter of 1994, and was completed by Sept. 1995. A second year of Carabid beetle collections has been completed. Identification of beetles and data analysis are incomplete, but indications are that Carabid populations are generally down from 1994 over the entire area. The initial effect of logging is that Carabid beetles of all species virtually disappear from the block. A third year of sampling will take place in 1996 to get initial data for all blocks where logging was not completed by June 1995, and to continue collections in the unlogged areas. It is expected that subsequent sampling will take place every 5 years thereafter.

- A.J. Stock, Nelson Forest Region, Nelson.

***Dendroctonus valens* vs pruned lodgepole pine.** While conducting stand level reconnaissance surveys near Stump Lake a significant amount of mortality was observed in a number of "pruned and spaced" lodgepole pine stands. Upon closer examination, it was found that the trees had been

girdled to a height of about 10 cm above the root collar. The pitch tubes and frass found suggested the attack was caused by *Dendroctonus valens*, the red turpentine beetle. This diagnosis was confirmed by Dr. L. E. Maclauchlan. Further inspections revealed that all of the openings with lodgepole pine as the primary species that were pruned and juvenile spaced in winter 1994 have been attacked by *D. valens* in the summer of 1995.

Temporary plots were established to tally current attack and to track future attacks. A total of 10 plots 5 X 50m in size were established in 6 openings. The total area of all the openings surveyed was 78.16 hectares. The average diameter of the trees sampled was 9.0 cm. The frequency of occurrence of *D. valens* attacked trees over the six sites was as follows:

Site No.	Total Stems per hectare	Attack Frequency
1	676	20.70 %
2	756	16.90 %
3	948	9.70 %
4	968	17.40 %
5	740	22.70 %
6	936	13.25 %
Average All Sites	837	16.32 %

It was observed that steeper south or west facing slopes had higher levels of attack, and larger diameter trees seem to be preferred on most sites. A review of the plot data will be done to determine if these observation can be confirmed. It is not clear what role fungal stain(s) vectored by *D. valens* play in tree mortality on these sites with small diameter trees already stressed by pruning. Preliminary speculation suggests that "pruning and spacing" seemed to predispose the trees to attack for the following reasons:

- (1) branch wounds increase volatiles released by the pruned trees, attracting *D. valens* into the stand;
- (2) pruning tends to increase stress on the trees, making them more susceptible to attack;
- (3) the sites with the highest pruning lift seemed to have higher attack levels
- (4) increased sun (and therefore heat) reaching the ground, making the microhabitat more suitable to *D. valens*.

- D. J. Piggin and K. J. White, - Kamloops Forest District, Kamloops

Bark Beetle Survey and Treatment Data to be Standardised across the Province: In order to better track the operation of the bark beetle control program in the province a set of standardised data attributes is being created. These attributes, now in the latter stages of review by district staff, will ensure that all bark beetle activities will be recorded in a standardised way throughout the province. This will allow districts to be able to review neighbouring district's programs, to more easily evaluate forest licensee programs and to contribute to regional and provincial summaries. The standardised attributes also allows us to soon create a customised computer data base for the beetle information.

There will be about 30 attributes that will be standardised and in most cases districts already collect this information though often not in the same way. Districts will be able to additionally collect any other attribute information they consider important. The system should be able to accommodate widely different programs such as, for example, a spruce beetle program in Mackenzie District or a mountain pine beetle program in Merritt District.

For additional information, such as copy of the draft attributes please contact the author.

- J.F. Henigman, Silviculture Practices Branch, Victoria.

Dendrochronology Study of Subalpine Fir Mortality Caused by Western Balsam Bark Beetle. The Timber Supply Review has initiated a study to identify the historical patterns of damage in climax Engelmann Spruce Subalpine Fir (ESSF) stands in the Prince Rupert Forest Region. Key to this study is the relating of bole and crown symptoms of dead trees with the estimated time of death. Currently, the Bulkley Forest District is administering a contract to sample breast height tree disks from 118 selected trees representing 6 wildlife tree categories (green and healthy to broken, limbless snags) and 7 diameter classes (20, 30, 40, 50, 60, 70, 80+ cm dbh). Tree ring analysis will obtain total age and, when referenced to living trees, an approximate time of death.

In addition, representative snags within each category will be analyzed for pulp quality to determine the relationship between merchantability and time of death.

An FRBC proposal will be submitted by a local Bulkley Forest District Forest Licensee this spring to use this snag dating technique to sample stands to reconstruct the stand's mortality pattern. From this modified cruise survey, estimates of mortality rate and merchantability will be determined. The results may have a large impact on the TSA's short-term timber supply and the harvesting priorities that are currently established.

A parallel study is being conducted by the Kamloops Forest Region and Simon Fraser University in Sicamous Ck. This study is also using dendrochronology but is looking at the detailed within stand distribution of mortality over time and is examining the potential for manipulating attack patterns with semiochemicals.

For more information, contact the undersigned or Bill Camenzind, Silviculture Specialist, Bulkley Forest District.

- T. Ebata, Silviculture Practices Branch, Victoria.

Confidence Limits Tested for Spruce Beetle Probing in the Prince George Region. A preliminary study was undertaken in the Prince George Region to test the accuracy of the current spruce beetle probing methodology in a moderately attacked spruce stand in the Osilinka River valley in the Mackenzie Forest District. A consulting firm originally probed the 77 ha block in January 1995. Sampling units were 100 m long by 10 m wide probe lines or strips spaced 100 meters apart in a parallel grid as per the interim procedure. Spruce beetle attack in the stand was approximately 5% 1994-attack, 7% 1993-attack, and 28% 1993-attack (or previous). On May 16, 1995, prior to any new beetle attacks, the same block was re-probed by having the contractor offset 50 meters. Initially, the data was analyzed by comparing the results of the first, second, and combined probes. Table 1 compares the data by the

number of 10 x 100 m sampling units. Further analysis will determine the effects of reduced sampling intensity (decreasing number of strips and/or number of sampling units per strip).

Table 1. Comparison of spruce beetle probing precision by number of strips

<u>Probe</u>	<u>Number</u>	
<u>survey</u>	<u>of sampling units</u>	<u>proportion of attack</u>
1	76	0.39 ± 0.07
2	74	0.41 ± 0.08
Combined	150	$0.40 \pm 0.05^*$

* 95% confidence limits

In this one moderately attacked stand, it appeared that the current 10 x 100 m wide strips spaced 100 m apart were sufficiently precise to provide the required information for operational decisions. Further studies of probing precision are required in stands with lighter and extreme incidence of attack. We will also examine spatial patterns of infestations based on level of incidence. More precise mapping of incidence "strata" will improve planning and effectiveness of spruce beetle sanitation and salvage harvesting.

- R. Hodgkinson, Prince George Forest Region, Prince George.
- V. Fletcher, Silviculture Practices Branch, Victoria.

FOREST DISEASES

Tomentosus Root Disease Control Trial Established in the Bulkley Forest District.

The first objective of the Nichyeskwa Creek Tomentosus control trial is to determine if destumping is a practical, effective means of controlling Tomentosus root disease. The second objective is designed to test whether treatments less severe than stumping are effective for controlling the disease. The two alternative treatment methods at Nichyeskwa Creek are fallow treatments in which no host conifer trees will be allowed to grow for 5, 10 and 15 year periods. The two fallow treatments are hardwood cropping and leguminous plant cropping. Following the fallow periods the areas will be planted with interior hybrid spruce.

The 11.5 ha trial site is located within one of REPAP's cutting permits. The licensee is responsible for basic silviculture on the control and stumped treatment units. The licensee's cooperation in the trial was one of the determining factors for the choice of location of the trial.

The area was logged in the December 1994. Low level aerial photographs of the site were taken in May '95. The 1:3000 scale photos were then enlarged to 1:300 scale in order to map the location of the stumps on the site. Approximately half of the stumps were located and digitized from the photo enlargements. The remaining stumps were located in the field using the photos. The enlarged photos and stump maps were not received until August. In the meantime the species, diameter and disease status of every stump within the trial site was recorded, and each stump was identified with a metal tag. Two summer students, Anne-Marie Roberts and Ryan Liebe were responsible for this work. They had the unenviable job of cutting the top off of every lodgepole pine and spruce stump on the site in order to determine if the stumps were infected with Tomentosus. Since the site had been logged in the winter with a feller buncher, it was very difficult to see any evidence of stain or pitted decay on the stump top without making a fresh cut.

The stump data collected by the co-op students was then used to determine the location of the treatment unit boundaries. The trial consists of 11 replicates of four treatments(including a control). The 40 m x 40 m treatment units were first located on the stump map. The boundaries were located in such a way that the level of Tomentosus infection in the treatment units fell into three infection classes. The infection classes were based on the basal area of pitted decay on the stump top. The four treatments were randomly assigned in each of the disease infection classes. The treatment unit corners were then located in the field and marked with pressure treated fence posts.

The stump removal units were treated Sept. 21 and 22. Craig Evans of FERIC recorded time and motion data during the treatment and will produce a report by the end of the fiscal year. Using the stump map, it was possible to record which stump the excavator operator was working on at a given time. This will allow for the time and motion study to incorporate the effects of differences in stump species, diameter and disease status.

The stumped and control treatment units will be planted with spruce in the spring of 1996. The leguminous plant fallow treatment will require some site preparation in order to provide a suitable seed bed. These units will also be treated and sown in the spring of 1996. The

majority of the hardwood cropping units are, fortunately, already stocked with aspen suckers. Some fill planting of deciduous trees maybe required.

The first growth measurements for the control and stumped areas will be collected in 2001. The same year the first third of each of the fallow treatments will be planted with spruce. The treatments will be compared on the basis of survival and growth.

- A. Woods, Prince Rupert Forest Region, Smithers.

Trial established in Lakes District to determine if branch pruning can salvage lodgepole pine stands that are heavily infested with stem rusts.

A branch pruning trial has been established near Burns Lake in the Lakes District. The primary objective of the trial is to determine if branch pruning can be used to reduce mortality caused by Comandra and Stalactiform blister rust. A secondary objective is to assess the current acceptability standards for the distance a branch canker can be from the stem.

The stand in which the trial is located was spaced down to < 1000 sph in 1993 without regard for the rust incidence in the stand. The current branch and stem rust canker incidence is about 50%. Without any treatment the stand will very likely become NSR.

The trial consists of ten 25 m x 25 m plots. Five of the plots will be randomly chosen for pruning in the spring of 1996. The remaining five plots will serve as the control. Each lodgepole pine within the 10 plots has been examined for the presence of rust cankers. The location of each branch canker was recorded for those trees that were not already girdled by stem cankers. The branch canker location was defined as to the whorl in which it was found, the quadrant of that whorl (N, E, S, W), and the distance in cm from the swollen edge of the canker to the stem. For those trees with stem cankers, the proportion of the stem girdled and the whorl in which the canker is located was recorded. The base of each infected branch was painted for identification following branch pruning.

The trees with branch cankers in both the pruned and control plots will be tracked to determine which of the branch cankers reach the stem and create stem cankers. With this information it will be possible to determine how close to the stem a branch canker can be before it is lethal. It will also be possible to determine the distance from the stem at which a branch cankers is still prunable.

- A. Woods, Prince Rupert Forest Region, Smithers.

Pine Needle Cast: *Lophodermella concolor* in the Cariboo Forest Region.

Lophodermella concolor has infected large areas of the Cariboo/Chilcotin over the past four years. Aerial surveys detected 55,000 ha's in 1995. *L. concolor* hasn't been considered a serious problem of lodgepole pine in the Cariboo Region because the disease normally has a one - two year cycle. However the current infection has lasted for four years and some of the lodgepole pine stands are looking like Dr Seuss trees. Therefore because of the length of the cycle it was decided to establish some permanent plots to determine if there is any growth loss and also to track any tree mortality. Co-op students Holly Williams and Kella Sadler established eight permanent plots in the Chilcotin near the Palmer Lake Road.

Some Biology: *Lophodermella concolor* is a fungus which kills and causes premature casting of the needles of lodgepole pine. The life cycle of *L. concolor* is one year. Spores are released from fruiting bodies on previously infected year-old needles in July. These spores germinate and penetrate only the young developing needles. The fungus undergoes a period of vegetative growth within the host tissue, so the evidence of attack does not become obvious until the year following infection. The year-old needles turn red-brown in May or June and fade to straw-coloured by July. At this point, the fruiting bodies begin to mature, appearing as shallow elliptical depressions, concolourous with the needle surface. Spores are released in July and distributed by the wind, and the life cycle is repeated. Needles begin to fall as the fruiting bodies mature, and the casting is complete about 14 months after infection. Because the previous needles are lost, the branches have a bare section next to the current years tuft of needles. This is referred to as "lions tailing". Levels of infection are higher when wet springs and early summers occur.

The Plots: The eight plots were established in areas of mild, moderate and severe levels of *L. concolor* infection in unspaced and spaced young lodgepole pine stands. In order to determine if growth loss is occurring cookies were cut from two - three representative trees adjacent to the plots and the width of the annual rings measured. Controls were either non-infected lodgepole pine or non-host trees. Measurement of internodes could be another method of determining growth loss.

The Results: YES---*Lophodermella concolor* appears to be slowing the growth rates of lodgepole pine in the Chilcotin. However the disease doesn't appear to be a problem if only present for one year. At this time we aren't sure of the effect of the disease on spaced stands, perhaps when the trees are remeasured in five years the effects will be obvious.

- D. Doidge, Cariboo Forest Region, Williams Lake.

Fungal Colonization of Root Systems of Spacing-Aged Douglas-fir. A recently initiated trial will determine if *Phellinus weirii* can colonize the root systems of spacing-aged Douglas-fir after operational spacing (by chainsaw) and chemical spacing with glyphosate. Test trees at the North Arm Research Unit (Cowichan Lake) were spaced in late September and the first set of trees was inoculated with *P. weirii* in mid-October. More trees will be inoculated with *P. weirii* at 1, 2, 3, and 5 years after spacing; roots will be sampled 12-15 months after inoculation. Another set of test trees will be inoculated each of the next four Springs, harvested in the Fall, and roots sampled 12-15 months later. Data collection will be completed by the end of 2001. Information on the ability of *P. weirii* to infect and colonize spaced Douglas-fir root systems will lead to a better understanding of disease behaviour in young spaced stands and will assist in the validation of use of the 'bridge-tree removal' concept in spacing practices. The effects of glyphosate stem injection on fungal colonization by *P. weirii* and other fungi will also be determined.

- R. Sturrock, Canadian Forest Service, Victoria
- S. Zeglen, Vancouver Forest Region, Nanaimo
- D. Carson, Cowichan Lake Research Station

Western Hemlock and *P. weirii*: Host Susceptibility and Disease Epidemiology. An upcoming trial will determine the susceptibility of western hemlock to *P. weirii* when it is planted and managed in pure stands or in mixed stands with Douglas-fir. Three diseased stands in the CWH Zone of the Sunshine Coast Forest District will be selected over the next two years, harvested, and plots replanted to pure Fd, pure Hw, or mixtures of the two species. Disease and tree attributes will be assessed every 2 to 4 years for approximately 20 years. Information on the epidemiology of *P. weirii* in western hemlock will lead to a better understanding of how to use this species on infested sites.

- R. Sturrock, Canadian Forest Service, Victoria
- S. Zeglen, Vancouver Forest Region, Nanaimo

Root Disease Survey Methods in B.C. (Abstract from a talk presented at a meeting of the Coastal *Phellinus* Management Cooperative, October 11-12, 1995 in Chilliwack, B.C.). In B.C., we have several different pre- and post-harvest survey methods available to us. Unfortunately, few of these methods have been validated using rigorous statistical methods. Other limitations include some methods being limited to stands of certain ages (i.e., mature vs. juvenile stands) and an incomplete process for incorporating collected data into a coherent and easily manipulated reporting system.

Into this midst, we are attempting to rationalize root disease survey methods. This is being attempted by taking certain sampling principles common to many current survey methods and creating a "universal" method. Several juvenile-aged test stands have been 100% sketch mapped and are being used as a baseline for the development of this new method. To start, an "oversampling" scheme was created to survey stands. This method consist of running parallel, 5 m wide transects every 25 m through the test stands. Data collected in these transects includes tree species, x and y coordinates within the transect, dbh, external observation of tree condition, and any pest damage that may be visible.

The goal is to develop a method that balances sampling efficiency against the time and cost of surveying. This will be attempted by taking the oversampled data and narrowing it down (i.e., reducing transect width and length) until an optimum compromise is reached. It is also hoped that a procedure can be worked into the data compilation program that will allow stratification of each surveyed stand into treatment units based on the survey data, thus assisting foresters in better planning silvicultural operations.

- S. Zeglen, Vancouver Forest Region, Nanaimo

***Phellinus* Management.** In the 1995 calendar year we had *phellinus* treatment on three sites. Excavator stump removal took place on approximately 14 ha in the Union Bay area. Pushover harvesting occurred at Merrill Lake and Mohun Creek and treated about five and two ha respectively. One additional site at the Quinsam River was clearcut as part of a CT entry, and was planted in March with red alder - approximately two ha. Additional area may be planted in this sale next spring (Pw or D).

We are planning to root rot survey approximately 150 ha in this fiscal year.

Coming on line for 1996 is a 19 ha forest health block at the Quinsam River which will be pushover harvested or de-stumped with excavators (optional for licensee). An additional 1.0 ha of pushover/de-stump is planned as part of an alder conversion/commercial thinning/forest health block at Campbell Lake. If you have any questions please contact me.

- R. S. Eriksen, Campbell River Forest District, Campbell River.

PERSONNEL

SILVICULTURE PRACTICES BRANCH

John Muir	Forest Health Officer	Victoria	387-8740
Peter Hall	Forest Entomologist	Victoria	387-3842
Val Fletcher	Forest Health Sampling/Surveys Specialist	Victoria	356-8763
John McLaughlin	Forest Pathologist	Victoria	387-8737
John Henigman	Forest Health Forester	Victoria	387-8738
Bernadette Blackmore	A/Forest Health Management Secretary	Victoria	953-3582
Don Summers	Manager, Nursery and Seed Culture Extension	Surrey	660-8855
Bev McEntire	Pest Management Biologist, Seed Production	Victoria	652-7613
Michelle Hall	Pest Management Biologist, Seed Production	Victoria	652-7613
Dave Trotter	A/Nursery Pest Management Specialist	Surrey	582-6910
Robb Bennett	Seed Pest Management Officer	Victoria	652-6593
Brian Wikeem	Noxious Weed Biocontrol Officer	Kamloops	376-1331
Marsha De Wolf	Noxious Weed Biocontrol Technician	Kamloops	376-1331
Susan Turner	Noxious Weed Biocontrol Specialist	Kamloops	376-1331

CARIBOO FOREST REGION

Regional Staff

Leo Rankin	Forest Entomologist	Williams Lk.	398-4439
Don Doidge	Forest Pathologist	Williams Lk.	398-4442

District Staff

Bob Mitchell	Forest Health Officer	Chilcotin	394-4700
Derek Poole	Forest Health Officer	Horsefly	620-3200
Brad Powell	Forest Health Officer	Quesnel	992-4400
Von Vickers	Forest Health Officer	Williams Lake	398-4341
Don Wright	Forest Health Officer	100 Mile House	395-7873

KAMLOOPS FOREST REGION**Region Staff**

Lorraine Maclauchlan	Forest Health/Research	Kamloops	828-4177
Hadrian Merler	Research Associate	Kamloops	828-4176

District Staff

Rob Martin	Forest Health Specialist	Clearwater	587-6781
Dave Piggin	Forest Health Specialist	Kamloops	371-6518
Ed Senger	Forest Health Specialist	Lillooet	256-1277
Pat Byrne	Forest Health Specialist	Merritt	378-8449
Margot Hollinger	Forest Health Specialist	Penticton	490-2242
Savas Koutsantonis	Forest Health Technician	Penticton	490-2250
Jim Wright	Zone Forester, Silviculture	Salmon Arm	832-1424
Wayne Anshelm	Forest Health Specialist	Salmon Arm	832-1428
Eric Haupt	Forest Health Specialist	Vernon	558-1784

NELSON FOREST REGION**Region Staff**

Art Stock	Forest Entomologist	Nelson	354-6633
Don Norris	Forest Pathologist	Nelson	354-6143

District Staff

Dan Reibin	Forest Health Officer	Arrow	
Ross Elliott	Forest Health Officer	Boundary	442-5411
Liz Goyette	Forest Health Officer	Cranbrook	426-3391
Emile Begin	Forest Health Officer	Invermere	342-4200
Julie Castonguay	Forest Health Officer	Kootenay Lk	825-1142
Norm Tennant	Silviculture Specialist	Revelstoke	837-7611

PRINCE GEORGE FOREST REGION**Region Staff**

Robert Hodgkinson	Forest Entomologist	Pr. George	565-6122
Richard Reich	Forest Pathologist	Pr. George	565-6143
Stuart Taylor	Forest Health Forester	Pr. George	565-6123

District Staff

Bruce Doerksen	Forest Health Technician	Pr. George	565-7100
Sharron Schiefelbein	Forest Health Technician	McBride	569-3748
Nathan Voth	Forest Health Technician	Vanderhoof	567-6363
Dale Desrochers	Forest Health Technician	Ft. St. James	996-5248
Chris Broster	Forest Health Technician	Mackenzie	997-2200
Steve Bower	Assistant Forest Health Tech.	Mackenzie	997-2200
Sherilyn Smith	Resource Assistant - Silv.	Dawson Creek	784-2350
Steve Lindsay	Resource Officer - Silviculture	Ft. Nelson	774-3936

PRINCE RUPERT FOREST REGION**Region Staff**

Vacant	Forest Entomologist	Smithers
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District Staff

Bill Camenzind	Silviculture Officer	Bulkley	847-6310
Glen Buhr	Silviculture Practices Forester	Cassiar	771-4211
Bob Wilson	Silviculture Officer	Kalum	638-5138
Paul Hanna	Silviculture Officer	Kispiox	842-7600
Todd Bresser	Forest Health Technician	Morice	845-6224
Terry Thrower	Forest Health Technician	Lakes	692-7515
Mike Grainger	Silviculture Specialist	North Coast	624-7460

PRINCE RUPERT FOREST REGION**District Staff (Con't)**

Ruth Edwards	Resource Officer-Silviculture	Morice	845-6200
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VANCOUVER FOREST REGION**Region Staff**

Don Heppner	Forest Entomologist	Nanaimo	751-7107
Stefan Zeglen	Forest Pathologist	Nanaimo	751-7108

District Staff

John Ingram	Resource Officer - Silviculture	Campbell Rv.	286-9300
Lucy Stad	District Silviculturist	Chilliwack	794-2100
Reinhard Muller	District Silviculturist	Duncan	746-2700
Allan Powelson	District Silviculturist	Mid Coast	982-2000
Mark Palmer	District Silviculturist	Pt. Alberni	724-9205
Chuck van Hemmen	Resource Officer - Silviculture	Pt. McNeill	956-5034
Ron Diprose	Forest Health Technician	Sunshine C.	485-0730
Mark Salzl	District Silviculturist	Qn. Char. Is.	559-8447
Jeff Fournier	Zone Forester	Squamish	898-2100
Dave Minhas	Zone Forester	Squamish	898-2100

MEETINGS

Forest Insect Management Course. The Forest Insect Management Course is scheduled for February, 1996 in Sault Ste Marie, Ontario, Canada. This course is designed to advance the skills and knowledge of forestry professionals in current techniques and principles for planning, implementing and evaluating Forest Insect Management programs, not simply as tactical control programs, but in reference to the broader scope of Integrated Resource Management (IRM). Course Instructors from across North America with world class technical reputations and superior communication skills will be facilitating a 10-day learning experience through lectures, field trips, practical field exercises and discussions groups.

This course is a cooperative Ontario Ministry of Natural Resources, Canadian Forest Service, Canadian Institute of Forestry venture. Upon completion of the Course, participants will be knowledgeable in:

- the essentials of entomology and principles of forest insect management,
- insect population surveys and damage appraisals and impacts,
- insect management tactics and strategies,
- insecticide application technology,
- forest insect management efficacy and impact from a biological and economic perspective, and
- current advances and trends in organizing an insect pest management program.

For more details on any of these courses, contact:

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Entomological Society of Canada - (joint meeting with Entomological Society of British Columbia). The meeting was held Oct. 15 -18 in Victoria, B. C. The conference was well attended by over 300 delegates representing government, university, and private entomologists in the fields of general entomology, agricultural entomology and forest entomology. Presented papers and workshops addressed a wide variety of topics.

- P. M. Hall, Silviculture Practices Branch, Victoria, B. C.

North American Forest Insect Work Conference - 1996 - In 1996, the annual Western Forest Insect Work Conference will be held in association with the Eastern and Southern Insect Work Conferences at a joint meeting in San Antonio, Texas. The meeting will be held in mid-April, 1996.

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

Western Forest Insect Work Conference - 1997 - The 1997 Western Forest Insect Work Conference will be held in Prince George, British Columbia during the week of April 21 to 24, 1997. A program has not, as yet, been drafted, but will include workshops and panels addressing various aspects of forest entomology and general forest and resource management. Any ideas for topics, or suggestions for the conference, should be sent to the undersigned.

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

Meeting of the Coastal *Phellinus* Management Cooperative. The Canadian Forest Service and the B.C. Ministry of Forests hosted 30 members of the Coastal *Phellinus* Management Cooperative on October 11-12, 1995 in Chilliwack. Participants included: forest pathologists from the USDA Forest Service in Oregon, forest pathologists and technical staff from the CFS and the BCMOF, industry representatives from MacMillan Bloedel Ltd., Pacific Forest Products Ltd., Weyerhaeuser Ltd., university and college staff and consultants. Topics presented and discussed included *Phellinus* nomenclature, the distribution of *P. weirii* in stands, screening for resistance to *P. weirii*, survey and management methodologies for the fungus, and possible Canada-USA cooperative research trials. The outdoor session included stops at a CFS/BCFS root disease spacing trial, a CFS study investigating the use of red alder in managing laminated root rot, an operational commercial thinning in a *P. weirii*-affected stand, and a research site where the spread of *P. weirii* on inoculated trees is being studied. A brief proceedings from the meeting will be available by December 31, 1995 from Rona Sturrock and Stefan Zeglen.

- R. Sturrock, Canadian Forest Service, Victoria (604-363-0789)
- S. Zeglen, Vancouver Forest Region, Nanaimo (604-751-7108)

Bark beetle courses. Courses to help bark beetle survey contractors identify and classify beetle infested trees in the field were presented in late summer 1995. There were 3 courses for mountain pine beetle (1 in Grand Forks, and 2 in Invermere), and one for Douglas-fir beetle (Invermere). A total of 44 people passed the courses. A list of successful attendees is available from the undersigned.

- A.J. Stock, Regional Entomologist, Nelson.

PUBLICATIONS AND REPORTS

- Neville, R. J., P. M. Hall, and J. Beale. 1995. Forest health research needs in British Columbia. *Forestry Chronicle* 71: 489-496.
- Hodgkinson, R. 1995. Management of the Spruce Beetle - The Scourge of Northern Spruce Forests. *In* Yukon Forests: A Sustainable Resource, Symposium Proceedings, February 2-4, 1995, D. Wortley and P. Hammamoto (editors). Yukon College, Whitehorse, Yukon, pp. 247-260.
- Hodgkinson R. and V. Fletcher. 1995. Ground detection survey methodology for spruce beetle, *Dendroctonus rufipennis* (Kirby), in the Prince George Forest Region. *In* Abstracts of the Joint Annual Meeting of the Entomological Society of Canada and B.C., October 14 - 19, 1995, Victoria, B.C., P. Belton (editor). Simon Fraser University, Burnaby, B.C. p. 32.