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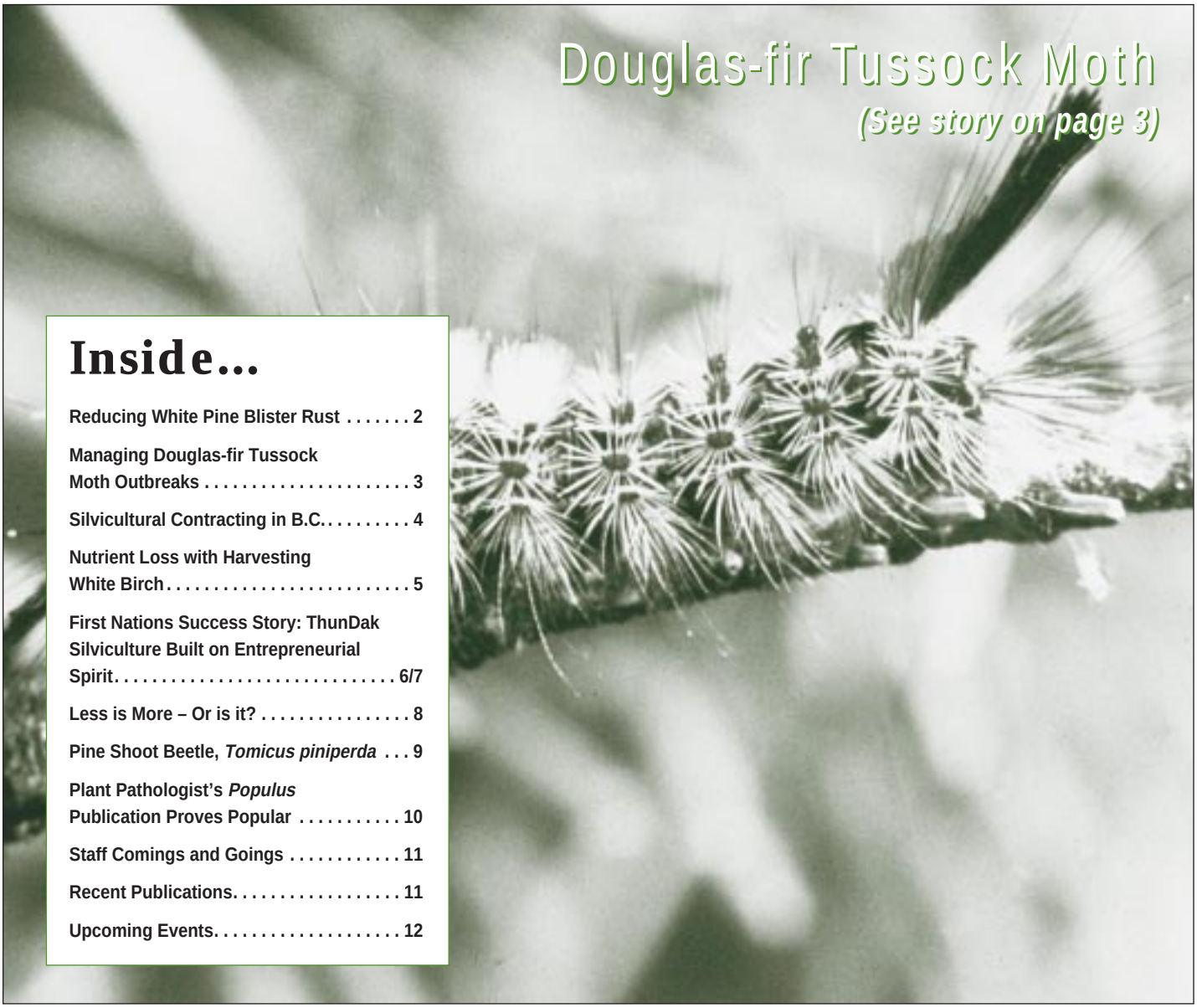

Douglas-fir Tussock Moth

(See story on page 3)

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Natural Resources Canada
Canadian Forest Service

Ressources naturelles Canada
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Canada

Reducing White Pine Blister Rust

"In many areas of B.C., white pine has been so depleted by the disease that it is no longer considered a viable commercial species."

Death by blisters. Sounds like something from a bad horror movie. But to a forest manager it can be a real nightmare.

White pine blister rust, caused by the non-native fungus *Cronartium ribicola,* creates diamond-shaped, orange-coloured cankers on branches and stems of native five-needle pines, often killing the tree. In many areas of B.C., white pine has been so depleted by the disease that it is no longer considered a viable commercial species. But current research by the Canadian Forest Service will help guide future pruning operations to control white pine blister rust.

Blister-rust and cankers on stem and branches of white pine.

"Research indicates that to optimize the benefits of pruning, stands should be pruned at an early age," explains Dr. Richard Hunt, a research scientist at the Pacific Forestry Centre and member of the Tree Biotechnology and Advanced Genetics Network. "And pruning should continue until a sufficient number of stems are pruned to a height of 3 m to ensure full stocking."

A canker on a branch within 60 cm of the stem is considered a "threatening canker" as it may expand down the branch into the stem. If the tree is pruned (lower branches are removed) before the fungus reaches the stem, it will not become stem cankered. In B.C., pruning to a height of 3 m protects trees from future cankering because in young stands cankers are rarely found above 3 m and in older stands, 85 percent of cankers are found below 1.5 m.

Dr. Hunt studied ten stands of pruned western white pine ten years after operational pruning took place. The stands, which were not pruned at an early age, were evaluated for white pine blister rust incidence and stand characteristics.

"We found that the success of pruning varied from stand to stand," says Hunt. "Since the stands had not been pruned at an early age, there was only a four percent reduction in threatening cankers and a five percent reduction in stem cankers, as few new cankers were initiated. Stands with the greatest increase in cankering contained *Ribes* spp. (currents and gooseberries that are also affected by blister rust), were open grown, or possessed a high component of small white pine. At present, repruning or scribing these affected stands would produce few additional healthy trees, although doing both treatments may enhance the number of healthy stems."

Young white pine can be safely pruned to leave only the top three whorls of branches, and they should be pruned to 1.5 m as early as possible. Pruning even before they reach that height is ideal.

Other species in the stand, however, should not be pruned, as they may act as barriers to the spread of blister rust spores within the stand. It is also recommended that dead branches on white pines be retained and that a high stocking density (in excess of 700 stems per ha) be maintained to enhance the success of pruning.

White pine blister rust is an introduced pathogen, thought to have arrived in the Pacific Northwest in 1910 on infected imported nursery stock but it was not discovered until 1921. In B.C. it has been reported on western white pine, whitebark, sugar, limber, eastern white and Swiss stone pine.

Dr. Richard Hunt can be reached at **rhunt@pfc.cfs.nrcan.gc.ca**

Managing Douglas-fir Tussock Moth Outbreaks

"We can now say with confidence that the operational testing of the management system developed for the Douglas-fir tussock moth is a success."

Who's afraid of a little furry caterpillar? Forest managers, that's who. Especially when that caterpillar is the larva of the dreaded Douglas-fir tussock moth found on ornamental trees, indicating that an outbreak is soon to occur in the forest.

The Douglas-fir tussock moth is a native defoliator of interior B.C. and western U.S. forests. Outbreaks recur about every seven to thirteen years, causing extensive tree mortality among its primary host, the interior Douglas-fir. In 1983, over 25, 000 ha were defoliated in B.C. and the devastation almost happened again in 1990 to 1993. But the Canadian Forest Service in cooperation with the B.C. Ministry of Forests developed a means of controlling that outbreak – in an environmentally friendly way.

"The Canadian Forest Service in B.C. has been working for 15 years in partnership with the B.C. Ministry of Forests and the U.S.D.A. Forest Service to research and develop a management system for this defoliator," says Dr. Imre Otvos, Senior Research Scientist at the Pacific Forestry Centre and member of the Pest Management Methods Network, who's been working closely with a recently retired researcher, Dr. Roy Shepherd, on the project. "We can now say with confidence that the operational testing of the management system developed for the Douglas-fir tussock moth is a success."

How does this management system work? First, stands susceptible to tussock moth outbreaks are determined by overlaying areas previously defoliated over forest type maps and biogeoclimatic zone maps. From these overlays, stands susceptible to outbreaks are defined. Next, pheromone traps are placed at monitoring stations to record Douglas-fir tussock moth populations in key areas within these susceptible stands. When 25 or more male moths are found in the traps for three consecutive years, it suggests that an outbreak will occur in the next two to three years. In the vicinity of these traps intensive sequential egg-mass surveys are conducted to confirm that an outbreak is developing and what level of defoliation is expected. These predictions are confirmed with larval sampling.

When the threat of outbreak and unacceptable defoliation is imminent, the area is sprayed aerially. Spraying may not sound very environmentally benign, but the spray is made of viruses that develop naturally during Douglas-fir tussock moth outbreaks, eventually curbing the outbreak (although it does not do so before serious defoliation and tree mortality occurs). Spraying does not completely destroy this native insect, a component of the ecosystem, but simply prevents devastating outbreaks and their undesirable impacts.

Normally, the flight lines are 30-40 m apart and the settling spray droplets cover the infested stands like a blanket. However, experiments indicate that similar control can be achieved even if flight lines are 100-200 m apart, because the virus spreads through areas of the stand not covered by the spray droplets. Although applying the virus in these widely spaced swaths results in some defoliation, this novel approach is the most cost-efficient means of control, as the virus is expensive to produce.

"These viruses are highly species-specific and only infect the host target or closely related species of the same genus," explains Otvos. "We are just introducing the virus at the beginning of the outbreak to initiate a viral epizootic (infection) before it would occur naturally, thus preventing the development of the outbreak and reducing tree damage."

"The results of experiments conducted during the 1983 outbreak provided data for the development of this pest management strategy which was tested successfully during the most recent (1990-1993) outbreak," says Dr. Lorraine Maclauchlan, Forest Entomologist with the B.C. Ministry of Forests Kamloops Forest Region. "We found the strategy could be used successfully to control the outbreak and minimize damage."

Depending on the dose, virus application can reduce larval populations by up to 95 percent and it can reduce the number of trees killed by about 93 percent in treated areas.

"We hope," adds Otvos, "that the Douglas-fir tussock moth pest management system will serve as a prototype for the development of pest management systems for other defoliating forest pests."

Dr. Otvos can be reached at **iotvos@pfc.cfs.nrcan.gc.ca** More information on this management system is available at **www.pfc.cfs.nrcan.gc.ca/practices/dftmoth.**

Silvicultural Contracting in B.C.

"It is essential that the 'art and science of tending a forest' be sustained."

Silviculture can be defined as the art and science of growing and tending a forest. Although not always a significant part of B.C.'s history, research suggests that silviculture is now, and should continue to be, an integral part of the forest industry.

Until the 1960s silviculture in B.C. was considered a minor activity associated with timber harvesting. However, decades of rapid forest development left what is termed "not-satisfactorily-stocked" sites leading to the formation of a distinct silvicultural sector. Societal values and public expectations concerning forest management in the 1980s expanded silvicultural activities and transformed contractual relationships. No longer only a means of regenerating sites, silviculture became important as the forest shifted from being only a timber-based resource to a multiple-use, sustainable forest. The Canadian Forest Service, in partnership with the University of British Columbia, is studying this shift in an attempt to understand the importance of the current role of silviculture contracting in the province.

"We conducted separate surveys in 1997 of B.C. companies holding timber tenures on public land, nurseries, seed orchards and silvicultural contractors," says Dr. Sen Wang, Forest Economist with the Industry, Trade and Economics Program at the Pacific Forestry Centre. "We have found that silviculture expenditures in B.C. are aimed primarily at site preparation, planting, brushing and other basic silviculture activities. We've also found that firms choose appropriate contractual arrangements for various silvicultural activities that reduce transaction costs."

Despite eventual dividends, forestry is an expensive industry. Yet, research indicates that if forestry is to remain an essential part of the province's economy, appropriate policies and strategies guiding the allocation of government funds for incremental silviculture must be devised. But current competing demands on public resources may threaten continued public sector spending on silviculture.

"From an economic efficiency perspective," explains Dr. G.C. van Kooten, Professor of Economics in the Faculty of Forestry and Associate Director of the Forest Economics and Policy Analysis (FEPA) Research Unit at the University of B.C. in Vancouver, "the long rotation lengths (around 60 years on the B.C. Coast and up to 100 years in the B.C. Interior) make silviculture financially unattractive given the high levels of costs in initial establishment and subsequent management. The costs of producing incremental gains in fibre production tend to outstrip potential future gains accruing from distant harvests."

Incremental silviculture requires permanent operational crews to space, prune and fertilize up to nine months a year. That puts quite a financial strain on the industry because of the long rotation periods and few interim cash flow opportunities available from timber assets.

"But despite these concerns," concludes Wang, "it is important that careful deliberation be given to providing an institutional setting that encourages sustainable management of the forest resource. This must include the ability to finance investment in growing the next generation of timber."

In order to ensure the social, economic and environmental value of the forest for future generations, it is essential that the "art and science of tending a forest" be sustained. Integral to that sustainability is continued support in the area of silvicultural research and operations.

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Nutrient Loss with Harvesting White Birch

"Canada has a desire to reduce dependence on non-renewable energy sources that emit CO_2, while at the same time ensuring the sustainability of our renewable resources."

Besides bell bottoms, Sonny and Cher and sideburns, the 1970s also marked the beginning of the oil crisis and the increased use of renewable sources of energy from our forests.

Although the 1980s brought relief to the oil industry, Canada continued its research into the environmental impacts of harvesting forests for energy use. Today, under the objectives of the Kyoto Protocol, Canada has an even greater desire to reduce dependence on non-renewable energy sources that emit CO_2, while at the same time ensuring the sustainability of our renewable resources. Under the initiatives of the National Forest Accord, researchers across the country continue to work together on understanding our forests.

Harvesting in a white birch stand.

In eastern Canada, four federal researchers are studying the impact of increased biomass removal from sites on future productivity, using a common research approach to understand the forests specific to that area. Dr. Brian Titus, a research scientist at the Pacific Forestry Centre (who recently relocated from Newfoundland) and member of the Ecosystem Processes Network, has been working with the Atlantic Forestry Centre studying the effects of forestry practices on three white birch sites in central Newfoundland.

White birch stems are harvested in Newfoundland for domestic firewood and lumber, while whole-tree harvesting is used for producing hog fuel for industrial use. It is expected that as the move away from traditional oil-based resources increases, there will be a greater need to increase whole-tree harvesting of white birch in the province.

"There are concerns that whole-tree harvesting may lead to long-term decreases in productivity on some sites because of nutrient depletion," says Titus. "The specific objectives of the research are to quantify nutrient removals in biomass at harvesting, and nutrient losses by leaching during the early years after harvesting."

The study indicated that whole-tree harvesting in the summer in white birch ecosystems resulted in a 20 percent increase in biomass as compared to conventional stem-only harvesting, but the amount of nutrients removed in the biomass was twice that using stem-only harvesting. In the long-term, this loss could reduce stand productivity on some sites.

"Since a majority of forest stands in central Newfoundland are on sites having moderately severe to severe limitations for the growth of commercial forests," explains Titus, "any losses in terms of productivity would be undesirable."

"Although further research is required, at this point in the research we can say that if you must whole-tree harvest, minimize the impact by harvesting after leaf-fall," adds Bruce Roberts, Forest Site Ecologist and co-worker on the study at the Atlantic Forestry Centre in Corner Brook, Newfoundland. "It would be prudent, however, to harvest at lower levels of intensity (i.e. stem-only) to preserve long-term site productivity."

Canada's commitment to sustainable forests ensures this research will continue. Researchers in the Canadian Forest Service are currently synthesizing nutrient loss results over the first five years after harvesting from 11 sites in eastern Canada. This will be followed by long-term modelling of losses over several rotations to determine the impacts of forestry practices. Not before the completion of such projects will definitive recommendations be available.

Dr. Brian Titus can be reached at **btitus@pfc.cfs.nrcan.gc.ca.** Bruce Roberts can be reached at **broberts@nrcan.gc.ca.** The other collaborators in the study of eastern Canadian sites are Dr. N. Foster (Great Lakes Forestry Centre) and Dr. M.K. Mahendrappa (Atlantic Forestry Centre, Fredericton).

First Nations Success Story: ThunDak Si

"First Nations entrepreneurs can make a difference in job creation and economic development in their own communities."

Of all the education and job opportunities that Nelson Leon has found for First Nations people while working as an employment and training counsellor in Shuswap territory, the most satisfying job placements are the ones he created within his own company. When Leon launched ThunDak Silviculture in 1997, he created seven jobs for members of the Adams Lake, Neskonlith and Little Shuswap Bands.

"I always knew that someday I'd have my own company," Leon says. Though the Adams Lake Band member holds a diploma in greenhouse horticulture, it is the small business management courses he took at Malaspina college that he credits for giving him a solid base of business skills. "I took some classes in business plan development, marketing, business operations and advertising when I was at Malaspina, which gave me the background I needed to run a company."

Leon also acknowledges the First Nations Forestry Program (FNFP) for helping him make his business a reality. The FNFP, jointly funded by the Canadian Forest Service and the Department of Indian Affairs and Northern Development, assists First Nations in building capacity in forestry (see I*nformation Forestry*, December 1996). The program made a contribution in 1997 to ThunDak Silviculture that allowed Leon to purchase some essential silviculture equipment while developing contract proposals. Besides using the contribution to build a business line of credit, Leon says the support from the FNFP was instrumental in helping him establish his company's credibility with bands and forestry companies in the area.

ThunDak Silviculture, which is named after Leon's children Thunder and Dakota, recently completed its first full year of contracting. With juvenile spacing, brushing and pruning contracts from Riverside Forest Products Ltd., Ministry of Forests Kamloops Forest District, International Forest Products Ltd. and Bell Pole Company Ltd., Leon kept two crews working for almost ten months in 1998. Leon's goal for 1999 is to secure contracts in the Kamloops and Salmon Arm Forest Districts. He is currently hard at work negotiating contracts for the 1999 season with Forest Renewal BC and various forest license holders.

Leon has put hard work and many hours into his accomplishments. His business day usually starts at 6:30 am, and often doesn't finish until late in the evening. In addition to managing his company, setting up and managing contracts, supervising his crews, writing proposals and handling his own bookkeeping, Leon works full-time as a training counsellor. As he juggles the challenges of a young family, a full time job and his own company, Leon keeps a close eye on his future business plans. "It takes at least five years to evaluate the success of a company," he says. "I've only been in business for about two years, which isn't enough time to get a true perspective."

It's clear that Leon has a positive perspective on being a First Nations business owner. "It's a great time to be an aboriginal entrepreneur. There are a lot of opportunities if you want to work hard," he says. "The way I look at life, the cup is half full, not half empty."

Leon believes that if more First Nations bands encouraged small business development on reserves, there would be more permanent jobs created. "Band-operated businesses are not always part of the real world of economic development," he says. "A band's economic philosophy is often to employ band members first, even if the company is not profitable. Bands may keep a white elephant business because it employs people even though it may not be competitive."

He also points out that privately owned businesses can be a vital source of employment for a First Nations band. His goal is to employ ten crew members by next year. "The Chief and Council of Neskonlith Band assisted me when I was just getting started," Leon says. "It set a precedent for business development on that reserve by providing a mechanism for the band to support an entrepreneurial venture."

New businesses will also offer valuable training opportunities for First Nations people. ThunDak crews received locally delivered silviculture training, as well as specialized instruction in areas such as first aid and map and compass use.

Leon also feels that First Nations-owned businesses will have a positive effect on Aboriginal communities. "When jobs are created on reserves, there's a significant positive impact on First Nations communities," he

lviculture Built on Entrepreneurial Spirit

says. “Of the First Nations who have found jobs in the forest sector in our area, very few have moved on to supervisory or technical positions. Aboriginal business owners, on the other hand, often encourage their employees to set personal goals, and offer opportunities for them to move ahead in their careers.” Leon advises potential business owners to be tenacious, to persevere, and to make a commitment. He also stresses the importance of developing a strong business plan.

“Banks want a marketing plan, they want to know who your customers will be, whether you’ll have a positive cash flow,” says Leon. “Even though it takes time to invest in business and management skills, the end result will make you a stronger entrepreneur.”

He is optimistic about the future for First Nations in the forestry sector. “There’s a positive future for First Nations, it’s a viable employment opportunity,” he says.

ThunDak Silviculture is well on its way to demonstrating that First Nations entrepreneurs can make a difference in job creation and economic development in their own communities.

To find out more about the First Nations Forestry Program, contact Nello Cataldo, Collaborative Forestry Program Manager at the Pacific Forestry Centre, at **ncataldo@pfc.cfs.nrcan.gc.ca.**.

Tree spacing by ThunDak Silviculture crew member.

ThunDak Silviculture crew member pruning tree using hand saw.

Less is More – Or is it?

"Whenever a complex ecosystem is manipulated, there are consequences to be considered."

"Less is more" can be applied to stand density management: removing trees in a stand reduces the competition, supplying more light, water and nutrients to the remaining trees. The result is fewer but more vigorous trees in a stand. However, whenever a complex ecosystem is manipulated, there are consequences to be considered.

Forest managers must consider the implications of stand manipulation on all forest values and choose methods that are economically, silviculturally, and environmentally sound.

"Manipulation of stand density which results in increased distance between trees affects the biology of forest insects and diseases through changes in stand climate and the quantity and quality of the food base," says Dr. Les Safranyik, a research scientist at the Pacific Forestry Centre and part of the Effects of Forestry Practices Network. "Of the climatic factors, temperature, light, and wind are most important to insect life whereas temperature, light and moisture may be especially important for disease organisms."

Greater inter-tree distance between residual trees may substantially change the microclimate of a stand by increasing precipitation reaching the forest floor, as well as increasing the amount of wind and sunlight on the site. Greater inter-tree distance may also increase tree vigour. Such factors can affect insects and diseases positively or negatively. For example, trees with more vigour produce more resin which repel some bark beetles but thinning results in large numbers of stumps and debris, prime targets for colonization and attack by other bark and wood-boring species.

"Bark beetles are the main concern regarding population build-up in stumps, logging residue, windfall and injured trees, especially in larger trees," adds Safranyik. "Both primary and secondary species can be important. Primary species are those that can kill apparently healthy trees, whereas the secondary species mainly breed in injured, decadent or dying trees, fresh windfall, logs and stumps, and usually attack healthy trees only during outbreaks."

Terminal weevils (lodgepole terminal weevil and the spruce weevil, also known as the white pine weevil) and pitch moths (northern pitch twig moth and the sequoia pitch moth) are other insects that often thrive in stands that have been thinned, but are relatively more damaging in young stands.

"Use of machinery in a stand may create wounds to the residual trees and thereby create infection courts for decay organisms and increase susceptibility to disease and insects," explains Dr. Duncan Morrison, also a research scientist at the Pacific Forestry Centre working in the Effects of Forestry Practices Network. "The group of wood decaying fungi that invade wounds on the boles of trees are called wound parasites. Fungal stain and decay are associated with up to 90 percent of these wounds and up to 10 percent of the merchantable volume may be degraded."

Other negative effects of thinning are the spread of dwarf mistletoe and Armillaria root disease.

"The rates of vertical spread by dwarf mistletoe within a tree crown and horizontal spread between trees is more rapid in open stands than in dense stands. In addition, mistletoe seed production increases with increasing light," says Morrison.

Armillaria root disease of conifers occurs in many stands in the southern one-third of B.C. When trees with infected roots are felled, much of the stump and roots are colonized by the fungus. Residual trees in root contact may be attacked by this fungus and the result can be a stand with little merchantable volume.

"There is an equilibrium between the host and fungus that is established in older stands and that is developing in juvenile stands; thinning upsets this balance by creating new inoculum," adds Morrison.

As the dependence on second-growth forest increases in B.C., stand management is becoming increasingly significant. But it is important that managers are aware of the long-term implications of manipulating stand density.

Dr. Safranyik is available at **lsafranyik@pfc.cfs.nrcan.gc.ca.** Dr. Morrison is available at **dmorrison@pfc.cfs.nrcan.gc.ca**

The Pine Shoot Beetle: *Tomicus piniperda*

"The pine shoot beetle is one of the most destructive shoot feeding species of pines in Europe. And now it's in Canada."

Unlike the ladybug, butterfly, or dragonfly, the pine shoot beetle has been aptly named. It feeds off the shoots of pines. In fact, it is one of the most destructive shoot feeding species of pines in Europe. And now it's in Canada.

It is believed that in the 1980s the pine shoot beetle entered North America in wooden packing material shipped from Europe. First discovered in 1992 in Ohio, it has subsequently been found in 22 counties in southern Ontario and 243 counties in nine U.S. states. It has been found only in the Great Lakes area.

"The destruction of pine shoots by adult maturation feeding causes the most significant damage," says Nick Humphreys, Forest Health Technician at the Canadian Forest Service, Pacific Forestry Centre and member of the Forest Health Network. "Approximately 10 to 20 cm of the shoots become bent over, turn yellow-red and often break near the entrance hole. Each adult can destroy between two and six shoots."

Pine shoot injuries are mainly limited to the top third of the tree. Severe shoot feeding reduces needle mass and leads to reductions in height and diameter increment. Natural pine stands under stress in the drier regions of Canada are probably the most susceptible to attack.

"In North America all native pine species are potential hosts of the pine shoot beetle," explains Humphreys. "The preferred species are red pine, Scots pine, and ponderosa pine. When beetle populations are high, balsam fir, eastern white pine, Norway spruce, and larch are also attacked."

"The most serious damage has been found in unmanaged Scots pine stands in southern Ontario," explains Rob Favrin, National Survey Coordinator for the Canadian Food Inspection Agency. "Quarantine restrictions on the movement of logs and pine Christmas trees from infested areas can have serious economic implications. But hopefully it will help prevent the spread of the beetle."

Pine shoot beetle adults are brownish black (darkening with maturity), and are 3 to 5 cm long. They create 2-mm holes when exiting tree stems and 2-mm to 3-mm entrance holes when attacking new shoots. Besides the adults, pine shoot beetle larvae and pupae can be found at different times in galleries under the bark of dead or stressed trees in spring, usually before native bark beetles.

Trees in infested areas must be cut at the root collar and the bottom 30 cm of trunk should be removed and destroyed. Potential host material (recently cut stumps, branches over 5 cm in diameter, and culled trees) should be destroyed by burning, burying or chipping. Applying an approved pesticide foliar cover spray and a trunk spray may deter pine shoot beetle attack.

Nick Humphreys can be reached at **nhumphreys@pfc.cfs.nrcan.gc.ca.** The Canadian Food Inspection Agency can be reached at http://www.cfia-acia.agr.ca/english/plant/protect/d-94-22e.html. A copy of the Pine Shoot Beetle Pest Advisory is available from the Pacific Forestry Centre Bookstore website at http://bookstore.pfc.cfs.nrcan.gc.ca.

Adult beetles mining pine shoot.

Plant Pathologist's *Populus* Publication Proves Popular

"The diagnostic manual provides both field and laboratory identification of common poplar diseases."

Diseases of Populus in British Columbia: A Diagnostic Manual is a new book designed for quick and accurate identification of common poplar diseases in B.C. It is the first easy to use regionally specific reference aimed at increasing awareness of poplar diseases and their impact.

Produced by the Canadian Forest Service and funded in part by Forest Renewal British Columbia (FRBC), the 157-page book describes diseases common to trees of the genus *Populus* (native aspen, balsam poplar, cottonwood, and hybrids) found throughout B.C. With over 220 colour photos and 24 distribution maps, the diagnostic manual provides both field and laboratory identification of common poplar diseases. The book also provides regionally specific disease impact and distribution information.

"With increased interest in management and utilization of native poplars in B.C., there is a correspondingly increased awareness and concern about diseases that might threaten this resource," says Dr. Brenda Callan, author of the book and a mycologist at the Pacific Forestry Centre. "With the establishment of hybrid poplar plantations in the province and plans by industry for continued development of this resource, new concerns about introductions and epidemics affecting these intensively cultivated stands have arisen."

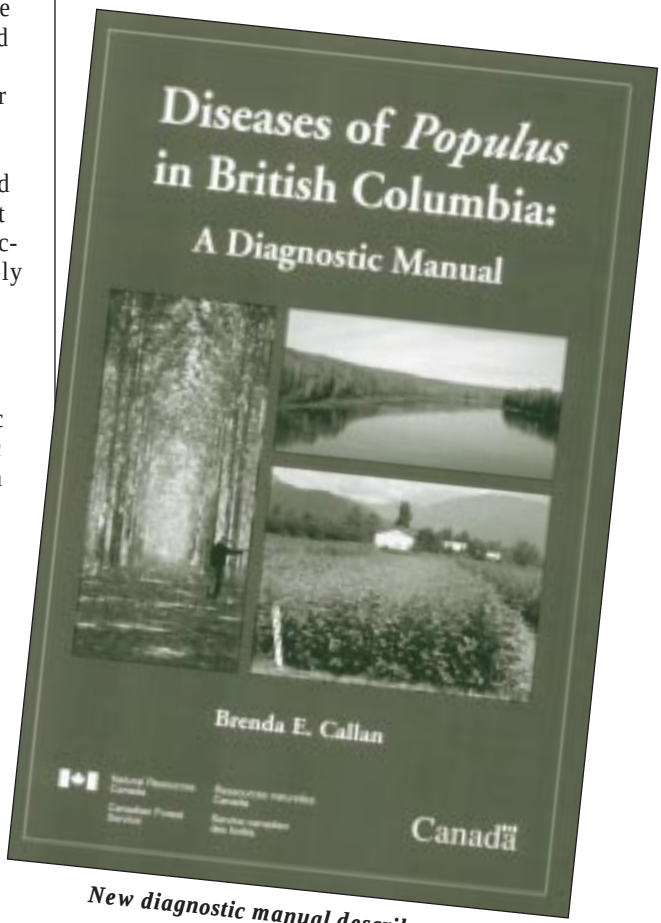
Increased interest in the local hardwood resource means a greater need for pathology research and disease diagnostic tools specific to B.C. Prior to *Diseases of Populus in British Columbia*, much of the technical information about poplar diseases in the Pacific Northwest was either unpublished, outdated, or scattered throughout the scientific literature, and could not be used quickly and easily in the field or diagnostic lab.

"Hybrid poplar plantation managers, managers of commercially harvested native poplar stands, pathologists, quarantine officials, mycologists, and naturalists are potential users of this book," says Callan, part of the Canadian Forest Service Biodiversity Network. "The manual will provide access to information on common diseases including native pathogens that are not extensively treated in other available literature. This information is necessary in order to predict and minimize pest damage under various stand-tending treatments."

Information and photos in the book have been collected from extensive regional poplar pathology surveys in major aspen and cottonwood regions throughout B.C. Fifty years of historical disease incidence data for *Populus* in B.C. was assessed and, coupled with collected specimens, provided the baseline for developing pest impact predictions.

Diseases of Populus in British Columbia: A Diagnostic Manual can be viewed with Acrobat Reader and is available free of charge through the Pacific Forestry Centre Bookstore at http://bookstore.pfc.cfs.nrcan.gc.ca.

Dr. Brenda Callan can be reached at **bcallan@pfc.cfs.nrcan.gc.ca**



New diagnostic manual describes B.C. poplar diseases.

Staff Comings and Goings

Farewell to **Jim Arnott** as he retires from his position as Senior Research Scientist, Silviculture. Jim was the lead scientist in the Montane Alternative Silvicultural Systems (MASS) project, a multiagency partnership studying alternative silviculture systems in mid-to-high elevation old-growth forests. He received a Canadian Forest Service Excellence in Partnership award for developing the partnership which has been held up as a model of new forestry practices regionally, nationally and internationally. He is a recognized authority on container seedling reforestation systems, photoperiodism of tree species, and regeneration silviculture of B.C.'s coastal montane tree species.

Goodbye also to **Dr. Tara Sahota**, who has retired as a Research Scientist in Entomology and Insect Physiology. Tara's research has been focused on host-pest interaction. He's been studying how resistance functions in the interaction between spruce weevil and spruce trees. His research has led to new methods for identifying resistant spruce trees. He has also researched population patterns of bark beetles and dormancy of the Douglas-fir cone moth to improve predictions of impending threat from these pests. Tara was one of the recipients of a Canadian Forest Service award for Scientific Excellence for his development of a host resistance theory based on the effects of the reproductive processes of the white pine weevil.

Congratulations to **Jim Wood**, who has just accepted the position of Director, Forest Resources Division and Manager of the Landscape Management Network. Prior to his appointment, Jim acted in the Director position for several months and had spent two years as the national coordinator for the Effects of Forestry Practices Network at the Pacific Forestry Centre on secondment from his Research Scientist position at the Great Lakes Forestry Centre.

Welcome to **Brad Stennes**, Forest Economist in the Industry, Trade and Economics Program. The main focus of his work will be on trade and competitiveness issues for the forest sector in B.C. as well as the economics of carbon uptake by B.C. forests. Brad comes to us from the University of British Columbia where he was a researcher in the Forest Economics and Policy Analysis Research Unit.

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Upcoming Events

1899 – 1999: The Canadian Forest Service Celebrates 100 Years of Service

Throughout the year the Canadian Forest Service will be celebrating one hundred years of innovative solutions in forest management. Watch for the next issue of Information Forestry for details.

International Garry Oak Meadow Symposium and Community Event
May 5 – 9, 1999
Victoria, B.C. Canada

This symposium will be addressing issues concerning biology, ecology, ethnobotany, management, restoration, conservation, protection, and education of Garry Oak Meadow ecosystems. For further information contact Conference Management, Division of Continuing Studies, University of Victoria, P.O. Box 3030, STN CSC, Victoria, BC, V8W 3N6.

The Application of Scientific Knowledge to Decision-Making in Managing Forest Ecosystems
May 3 – 7, 1999
Asheville, NC, USA

This international conference will bring together the leading providers and users of decision support systems (DSS) to discuss contemporary issues surrounding the development and applications of DSS to forest management. Canadian Forest Service researchers from across the country will be among the presenters. For more information contact Dr. H. Michael Rauscher, USDA Forest Service, 1577 Brevard Rd., Asheville, NC 28806, U.S.A. Phone: (828) 667-5261 (ext. 102); Fax: (828) 667-9097.

Combating Tree Theft Using New DNA Technology – Ensuring Successful Prosecutions
May 18 – 19, 1999
Victoria, B.C. Canada

This workshop, offered through the partnership of the Canadian Forest Service, the B.C. Ministry of Forests and the Royal Canadian Mounted Police, introduces the basics of DNA technology as it applies to forestry, coupled with current forensic and legal issues. For further information contact Rod Maides, Canadian Forest Service, 506 West Burnside Road, Victoria, B.C. V8Z 1M5; Phone: (250) 363-0737; Fax: (250) 363-6006.; Email: rmaides@pfc.cfs.nrcan.gc.ca.

Plant Health: Meeting the Challenges – Joint Annual Meeting of the Canadian (CPS) and American (APS) Phytopathological Societies
August 7 – 11, 1999
Montréal, Quebec, Canada

Several Canadian Forest Service employees will be among the presenters at the joint annual meeting of the Canadian (CPS) and American (APS) Phytopathological Societies. For further information contact the Program Chair, Neal Van Alfen, Texas A&M University, Room 120, Peterson Bldg, Plant Pathology & Microbiology, College Station TX, 77843-2132; Phone: (409) 845-8288; Fax: (409) 845-6483.

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