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FEBRUARY 2007

MPB Invasion of Boreal Forests

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Editorial

by Dirk Brinkman

A letter to the Right Honourable Prime Minister, Stephen Harper

Dear Mr. Harper:

You have a historic opportunity to be the defender of the forests of Canada, a nation founded on people's labour, investment and trade harvesting healthy Canadian forests. Forests are dynamic, ever-changing systems, but the normal range of variability is now being hurdled. Biological episodes in our forests present a forest sector that is in crisis in many parts of Canada. These systemic challenges can only be met through a cross-Canada strategy, led by the federal government.

Our forests are icons of our Canadian identity and economy; you need no reminder of their importance or of their heroes. Canadian silviculturalists, however, have had less recognition. In the past decades, the Canadian silviculture industry has bridged the gap between the forest sector and ENGO community with practical forest solutions. Since 1990, each year more Canadians reforest what we reap than serve in the Canadian Armed forces. Over 100,000 young people and students served sustainability's goals in muddy-boot bush planting camps this past decade. Having learned to work harder than any other physical work ever measured in ergonomics, they have emerged into other sectors of our economy as some of Canada's most vital entrepreneurs.

Over-harvesting is no longer the threat to forest sustainability that it was in the 1970s and 1980s. By allocating long-term harvest rights to private corporations under sustainable management regulations, our provinces have nurtured and conserved the largest intact natural forest area in any developed country. The conservation covenant between provincial governments and the forest sector is globally unique, and good for forest health. Forest harvests mimic and integrate disturbance cycles and the remaining forests enjoy protection from historic extremes of fire and pests.

However, the threats to sustainability now come from other directions. South of our forest tenures, private land cleared for agriculture and development leave very little forest. North of Canada's tenured forests, wildfires and pests rage unchecked - the spruce bud worm infestation stretching from the Yukon through Alaska is an unfortunate example. Oil and gas fracture intact forests and climate change is also making our tenured forests vulnerable.

One of the most evident symptoms of climate change is the unprecedented attack of the mountain pine beetle (MPB). While BC's 20 million acres of pine mortality is well known, less widely reported was the gradual invasion into Alberta, capped by the vast number of the beetles that rained down unceremoniously between Grand Prairie and Fox Creek, Alberta on July 26, 2006. A massive strata cumulus updraft in BC must have lifted the beetles into a jet stream, which hurtled them across the Rockies. When they rained down from the sunny sky, farmers ran outside to see what was falling on their tin roofs and found gutters streaming with beetles.

The MPB invasion into regions where jack pine stretches beyond BC and Alberta to provinces east, creates a vulnerability for the boreal forests, where deep snow is insulating too many of the invaders. The Alberta forest sector may salvage more aggressively than BC, but this alone is not the crisis. Research models predict this invasion will be among the first of many unprecedented predator/prey, host/parasite or plant/herbivore asymmetries arising from climate change.

Salvaging infested stands ahead of beetle epidemics shifts the forest sector into a regional boom and bust cycle, undermining Canada's remote rural communities. Alberta has joined BC in this accelerated harvest, inviting US-Canada Softwood Agreement challenges almost before the ink is dry, while the US forest industry deals with its own abundance of salvage wood.

The rapid appreciation of the Canadian dollar, US market access barriers, and increasing energy and transport costs have made Canada's forest industry vulnerable just as global warming begins to take an accelerating toll. This combined assault on Canada's timber/conservation paradigm requires federal government leadership, not only because these are trans-provincial environmental challenges, but because these changes threaten Canada's future balance of trade and its international commitments.

Canada's political leadership must face the extreme events in Canada's forests with strong protection, conservation, and restoration initiatives. I invite you, Prime Minister Harper, to champion a national initiative for forest carbon restoration, protection, and conservation, in the honourable tradition of the timber/conservation covenant through which governments and the forest sector have historically protected Canada's forests.

You are the chief international spokesperson for Canada's well-earned reputation as a forest nation, and we in the silviculture industry expect a new forest carbon conservation covenant.

Dirk Brinkman, CEO

Brinkman Forest Restoration Ltd.

MOUNTAIN PINE BEETLE
Invasion of Boreal Forests

by David Langor, Adrianne Rice, and Daryl Williams

MPB infested Ponderosa Pine

The mountain pine beetle (MPB) is a tiny insect with a lot of clout. These 4-6 mm-long beetles seem clumsy and harmless as they walk around in the palm of your hand; however, their power and impact stems from their immense numbers. The extensive over-mature pine forests of BC provides an ideal breeding ground that produces trillions of beetles every year. Currently over 8 million ha of lodgepole pine forests have been infested in BC, and over the last 7-8 years the MPB has been steadily expanding its impact and range in Alberta. The recent dramatic increase in MPB populations have been attributed to a combination of several successive, warm winters that aid beetle survival, and a copious abundance of over-mature lodgepole pine forests that are highly susceptible to beetle attack.

Adult beetles fly well and are very efficient at dispersing while locating suitable hosts. Once a host is located (late July and August), female beetles produce chemical attractants that call in other beetles to mass attack the tree. The MPB is allied with several species of fungi that they inoculate into the trees. Once the fungi become established they spread quickly to block the water and food transportation system in the tree, thereby helping to overcome tree defenses. These fungi stain the outer wood (sapwood) a blue-green colour, and are thus called blue-stain fungi. After the beetles lay eggs, hatched larvae feed in the phloem, further destroying the conducting tissue of the tree. Larvae overwinter, continue feeding and development the following spring, and a new generation of adults emerge in late July and August. At high elevations and latitudes, development may take longer than one year.

The MPB is rapidly expanding its range. Although it is native to Alberta, previous outbreaks in the 1940s and 1977-1985 were restricted to the southwest. Since the mid-1980s, the MPB has spread at least two degrees latitude northward in Alberta. Populations have persisted in the Wilmore Wilderness area for the past 8 years, and dramatically increased from 2004-2006. As well, the MPB has invaded forests east of the Rocky Mountains in northeastern BC. In 2006, beetles penetrated into northwestern Alberta at least 250 km, resulting in widespread and successful colonization of pine in the western boreal forest. There is great concern that the MPB may continue to move eastward in the boreal, ultimately resulting in colonization of jack pine. If beetle populations became established in jack pine, this would establish a potential conduit for invasion of eastern Canada and the southeastern US.

The MPB has a broad diet of pine hosts. Although lodgepole pine is its most common host, the MPB attacks and kills many native and introduced pine species within its range. Jack pine, which ranges across the boreal region from Alberta to the east coast, is taxonomically and chemically similar to lodgepole pine. In Alberta, lodgepole and jack pines readily hybridize, creating a large "hybrid zone" over much of the north central and northwestern part of the province. In 2006, the MPB successfully colonized hybrids in the Grand Prairie and Peace River areas, as far east as Fox Creek. Therefore, the risk of MPB continuing to disperse eastward, with prevailing winds, into jack pine forests is high. MPB can successfully reproduce in cut logs of jack pine, but this success cannot be extrapolated to natural stands of healthy, living trees. It is unknown whether MPB can or will naturally colonize and breed in living jack pine. The answer to this question is critical to enable appropriate management

planning in boreal forests. While it cannot be answered directly without risking the introduction of MPB into susceptible stands, it can be predicted using a series of lab and field experiments. Over the last two years, staff at the CFS Northern Forestry Centre in Edmonton has been involved in research to assess the risk of invasion of jack pine by the MPB. This work is funded by the provinces of Alberta, Saskatchewan, Manitoba and Ontario, the federal Mountain Pine Beetle Initiative, and the US Forest Service.

Inoculations on live trees have shown that jack pine is at least as susceptible to the three species of MPB-associated, blue-stain fungi as is lodgepole pine. We also found that fungi are adapted to the colder, boreal temperatures, although the three species perform differently depending on temperature profiles, virulence (the speed of fungal spread in the tree), and spore production.

As beetles and larvae are restricted to the phloem layer of the bark, the thickness of this layer is critical to beetle success and population increases. Our work shows that jack and hybrid pines have much thinner phloem (0.8-1.5 mm) than mature lodgepole pine (2.0-3.5 mm), suggesting that jack pine and hybrids may be less suitable hosts for MPB. However, laboratory breeding work showed that MPB does at least as well (in terms of fecundity and survival) in jack pine bolts as in lodgepole pine bolts of similar thin phloem thickness (1.0-1.3 mm), but not as well as beetles in thick-phloem lodgepole pine. Furthermore, beetles emerging from thin-phloem hosts are significantly smaller than those from wild populations in lodgepole pine, and this has implications for beetle fecundity and survival. Based on this work, there is no obvious biological barrier to MPB invasion of hybrids and jack pine.

In 2006, the large penetration of MPB into northwestern Alberta resulted in successful colonization of hybrid pines, corroborating our predictions. This unexpected, large eastward dispersal also provided us with an opportunity to commence investigating the success of MPB in hybrids in the wild. This preliminary work revealed several interesting facts:

1) MPB successfully attacked and bred in hybrids, as our lab work predicted.

2) Most brood developed to fourth larval instars, pupae, and adults before the onset of winter, compared to the more normal situation of overwintering in first, second, and third larval instars. As larger larval instars have better cold tolerance, we expect populations in northwestern Alberta to have very good overwintering survival. Furthermore, we expect an unusually early start to the dispersal period. This may result in quite a different life cycle for MPB in the boreal compared to portions of the range further west and south. The implications of this scenario need to be explored.

3) Mortality of MPB in hybrids preceding winter was quite low. It is particularly interesting that there was virtually no parasitism. This will aid rapid increase in MPB populations.

Clearly the invasion of the boreal forest by MPB is well underway. The possible spread of MPB to jack pine has serious economic, social, and environmental implications for Canada. Alberta is now the front line for battling the MPB and preventing (or slowing) eastward invasion. Our continuing research is critical to understand how the MPB is adapting to the boreal environment and a novel host in order to predict future trends and provide the best advice to forest managers to enable appropriate proactive planning.

David Langor is Research Scientist - Insect Management & Biodiversity with the Canadian Forest Service and can be reached at 780-435-7330.

Forest Health

by Andrew Fall, PhD

Landscape-scale Forest Management and the Mountain Pine Beetle

The mountain pine beetle (MPB) has killed much of the mature lodgepole pine over an area of approximately 9 million hectares in BC in recent years. This major event has widespread implications for current and future forest management, ranging from effects on timber supply and operations, to impacts on wildfire urban interface, wildlife habitat, and aesthetics.

Three primary MPB management strategies in forestry include prevention, direct control, and salvage. Preventive management is used when beetles are at or below endemic levels and managers have the opportunity to be proactive in making trees, stands, and landscapes less susceptible to large infestations. Direct control is used when an infestation is underway and management efforts are reactive and primarily directed at killing beetles in order to reduce population size and spread. Salvage occurs either post-outbreak or during outbreaks that are too large for effective control.

Effective forest management planning requires information on which to base resource allocation decisions and expectations (eg. allowable harvest levels, fell and burn budgets, focus of harvest treatments, access to infested trees). Landscape-scale risk information ranges from the location and severity of infested trees and susceptible stands to estimated trends and impacts.

To examine the main outbreak in BC, we developed an empirical projection model, BCMPB, to forecast possible impacts over the entire province for the next 20 years. We utilized 7 years of infestation history collected through the Provincial Aerial Overview of Forest Health and a seamless spatial dataset for the entire province (forest cover, physical environment, and management). Based on recent infestation mapping we estimated that approximately 25% of the merchantable pine volume in the province was observed to be dead (red or grey crowns) during the summer of 2005 (Figure 1). Because trees killed during the summer cannot be detected through aerial surveys (their crowns are still green) we relied on the projection model to estimate that an additional 10% of the pine volume was killed during that summer. We projected that by 2010 over 60% of the merchantable pine

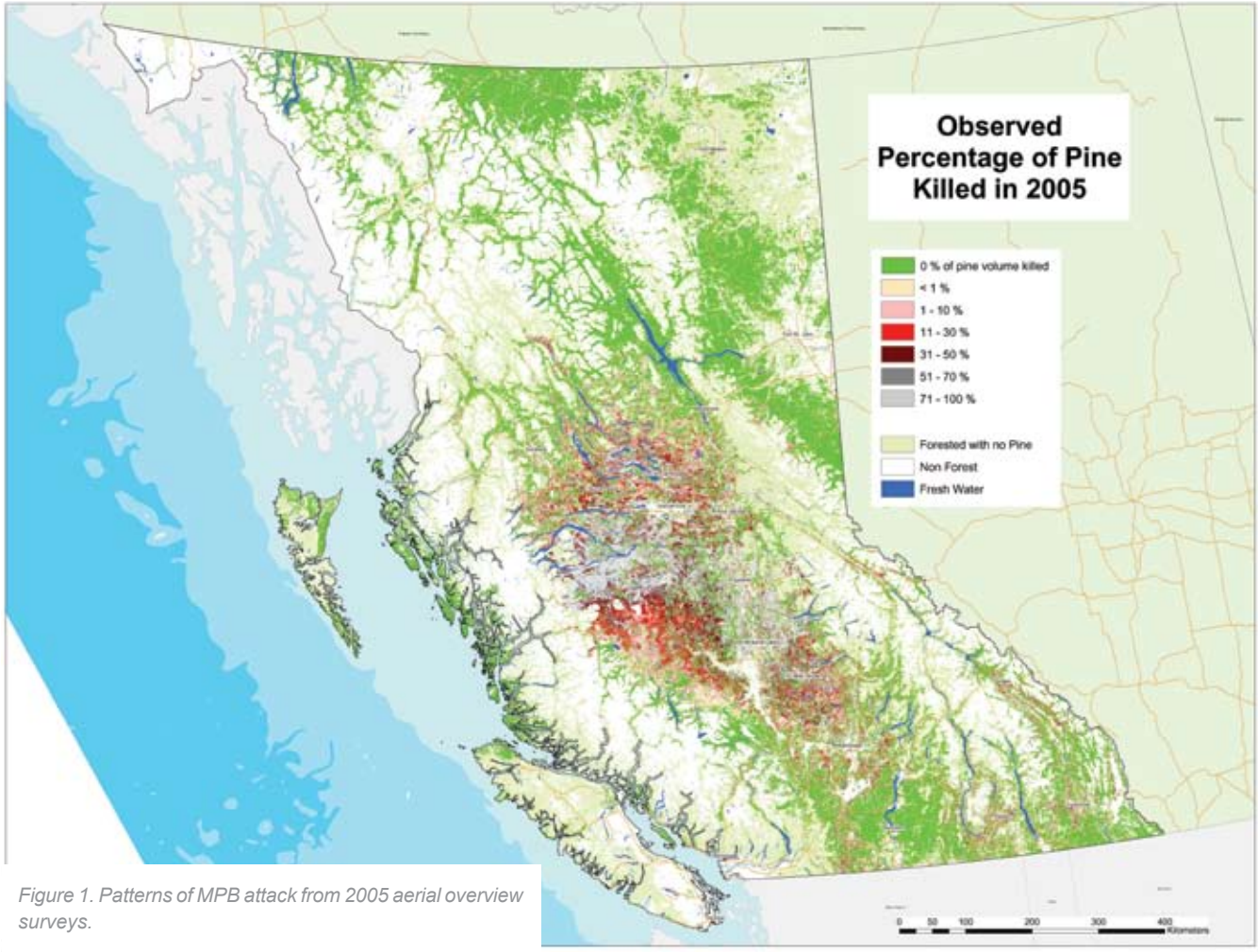


Figure 1. Patterns of MPB attack from 2005 aerial overview surveys.

volume in the province will be observed as dead and that by 2013, when the infestation will have largely run its course, 80% of the merchantable pine volume will be killed (Figure 2). Further maps of the input data and the projections can be found at www.for.gov.bc.ca/hre/bcmpb.

The results of the projection have helped increase awareness about the severity of the problem and the limited opportunities for direct control, and have been used to help direct funding for control efforts to examine the impacts of the forest management response on the transportation system, and to investigate the possibility of developing a bio-energy plant in the most severely affected area.

The MPB has also been increasing in the boreal forest of Alberta, and poses a risk to the jack pine stands of central Alberta and Saskatchewan. To date, the management response of Alberta has been to identify and remove (by fell and burn) as many newly attacked trees as possible. We have been examining the spatial pattern and connectivity of susceptible host stands to identify the degree to which stands are linked to infested areas in BC and western Alberta, and to integrate work on climate-related expansion of the MPB range. Our goal is to help forest managers prioritize harvest in pine stands to reduce overall landscape scale risk.

In areas of central BC where the outbreak has largely run its course, the management focus is on salvage and post-salvage timber supply. In conjunction with the BC Forest Service, we have incorporated the results of the BCMPB projections into a forest estate model to assess timber supply impacts and to explore uncertainties regarding the shelf life of standing dead wood, regeneration, the potential of residual trees (understory and non-pine canopy trees), and salvage options. This analysis will be used to help the chief forester of BC set allowable harvest levels.

The unprecedented MPB outbreak in western Canada requires novel approaches to forest management. Decision-support tools may provide information to assist managers in making appropriate decisions for reducing landscape-scale risk or post-outbreak re-planning.

Andrew Fall is president of Gowlland Technologies Ltd. and an adjunct professor in Resource and Environmental Management at Simon Fraser University.
Acknowledgement is made to T. Shore and B. Riel (CFS) and M.Eng for collaboration on the projects cited, and for funding from the MPB Initiative of the Canadian Forest Service and the BC Ministry of Forests.

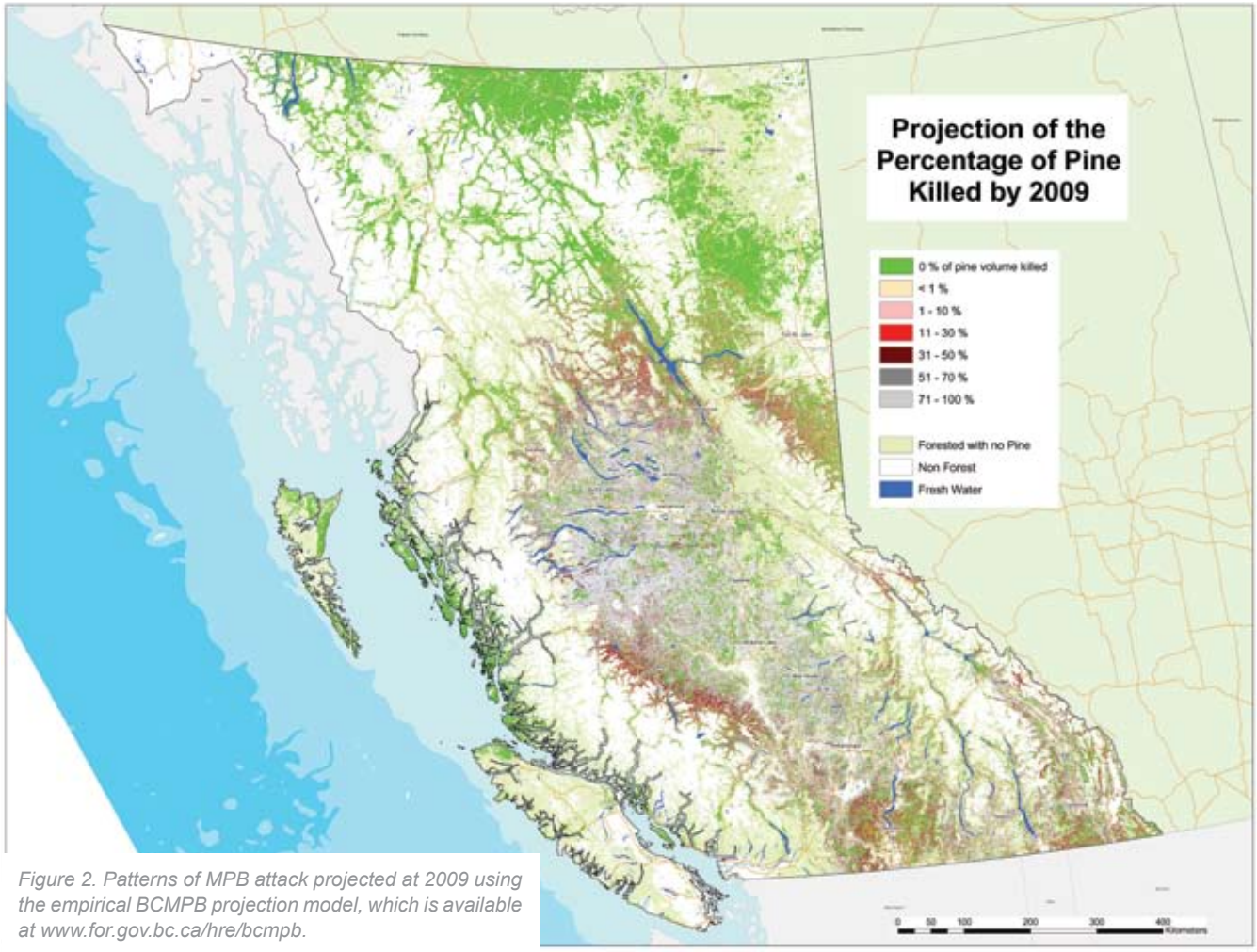
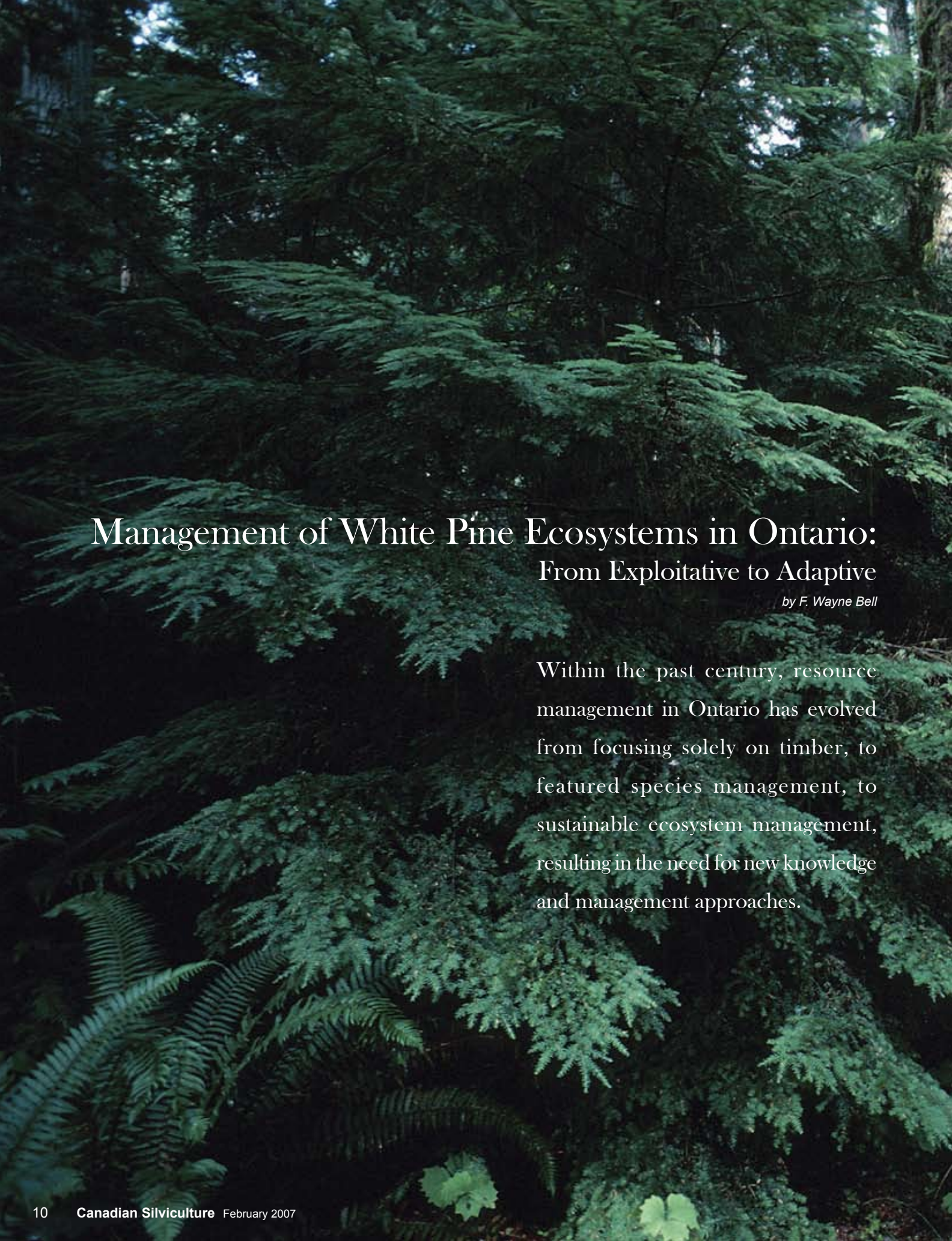


Figure 2. Patterns of MPB attack projected at 2009 using the empirical BCMPB projection model, which is available at www.for.gov.bc.ca/hre/bcmpb.



Management of White Pine Ecosystems in Ontario:
From Exploitative to Adaptive

by F. Wayne Bell

Within the past century, resource management in Ontario has evolved from focusing solely on timber, to featured species management, to sustainable ecosystem management, resulting in the need for new knowledge and management approaches.

Adaptive management, or "learning by doing", is considered a recent paradigm, initiated in the late 1970s. However, an evaluation of the history of eastern white pine and its management in Ontario illustrates that adaptive management has been evolving since at least 1878 when Algonquin Provincial Park was first proposed. This assertion is based largely on information gleaned from Ken Armson's book, *Ontario Forests: A Historical Perspective* (2001), and other provincial historical documents, as summarized briefly below (with timeframes modified to reflect the development of Crown policies).

1000 BC-1650 AD:

Palisades, longhouses, and rotational agriculture

Although fire played a significant role in the sustainability of white pine ecosystems throughout most of Ontario, the role of land clearing for agriculture cannot be overlooked. Sometime between 1000 BC and 500 AD, the practice of agriculture was introduced into southern Ontario, first with corn, followed by squash, beans, sunflowers, and tobacco. By 1200 AD agriculture was widespread.

By the time Champlain visited, Huronia (present area of north Simcoe County) was described as "well cleared". Population estimates for Huronia ranged from 21,000-30,000 people and a village of 1,000 people required about 145 ha in crops to subsist. Villages established on well-drained soil were forced to move every 8-12 years by decreasing crop yields. Clearing new cropland involved cutting smaller trees for use in longhouses or palisades and girdling larger trees. Abandoned cultivated lands reverted to scrub vegetation and forests eventually reestablished. Since primarily coarser-textured, well-drained soils were used for crops, pine regeneration dominated.

During the mid-1600s, aboriginal populations were decimated by war and disease, and much of the former cultivated lands in southern Ontario reverted to forests. Evidence such as pollen analyses suggests that many of the "pristine" (as perceived by the early European settlers) pine forests were actually mature and over-mature forests that established on abandoned aboriginal agricultural lands.

1650 AD-1848 AD:

Early European settlement and the square timber era

Deforestation by European settlers for agriculture and small sawmills was initiated post-1650. By 1824, approximately 20,235 ha were under cultivation. Settlers paid little attention to soil fertility and were forced to clear more land every 8-10 years - a pattern similar to that of aboriginal agriculture; however, "farmed-out" land would become rough pasture at best.

Land clearing activities were overshadowed by the exploitation of white pine to meet Britain's demand for timber. In 1806, Napolean cut off Britain's supply of timber from the Baltic countries and Britain turned to its colonies for wood. Ontario's white pine were harvested, squared, and shipped to Britain to be used for shipbuilding. By 1830, timber trade from the Ottawa Valley dominated the Canadian economy. After 1850, British demand for square timber decreased, but the white pine resource had been greatly diminished.

During this period, legislation was passed that reserved all pine on both Crown and granted lands for the Crown. Unfortunately,

no effective means of enforcing regulations about cutting pine or receiving payment were established nor were efforts made to protect or regenerate white pine. Even worse, in 1826 dues for white pine logs that could be squared were half those for logs that could not be squared, resulting in partial harvesting of the largest, straightest trees in pine stands.

1849-1994:

Crown Timber Act

Passed in 1849, the Crown Timber Act set the framework for disposition of timber on Crown lands. This was followed by the Reciprocity Treaty of 1854, which provided free access for Canadian lumber to enter the US market. At the time, both federal and provincial governments wanted timber revenues and both issued cutting licenses, sometimes for overlapping areas. The Canadian Constitutional Act of 1867, which granted jurisdiction over natural resources to the provinces, ended the period of both federal and provincial governments granting harvest licenses.

In 1871, sustainability of the forest resource was questioned by the first Prime Minister of Canada, Sir John A. MacDonald. In a letter to the premier of Ontario he wrote, "We are recklessly destroying the timber of Canada and there is scarcely the possibility of replacing it." This marked the beginning of public concern about resource management and possibly encouraged the establishment of parks and protected areas.

Proposed in 1878, the objectives of Algonquin Provincial Park were very forward looking, and could be considered the beginning of adaptive management in Ontario. It was obvious that Ontario's natural resources could not be sustained under current practice and an alternative approach was required. The proposed objectives were quite radical for that time period:

- preserve the headwaters of the watersheds
- preserve the native forest
- protect game and fur-bearing animals, fish, and birds
- provide an area for forestry experimentation
- serve as a health resort and pleasure ground for the benefit, advantage, and enjoyment of the people of the province

Pine harvesting peaked at approximately 4 M m3 in 1896, the year before the passing of the U.S. Dingley tariff, which placed prohibitive duties on manufactured products but not round wood. In 1898, Ontario retaliated with legislation requiring all pine logs cut from Crown lands to be manufactured in Canada, resulting in new sawmills and greater economic stability for Ontario's northern communities.

By 1900, the need for forestry professionals was recognized and the Canadian Forestry Association (CFA) was founded. At a CFA meeting in 1906, Dr. J.F. Clark noted that Canadian foresters could learn much from European and American foresters, but "… in the end they must work out their own salvation by development of a system of Canadian forest conditions." Dr. Clark also advocated a systematic means of inventorying the forest and a need for trained, practical foresters.

In the early years, reforestation was considered the foundation of forest management and Ontario opened a tree nursery in 1908 at St. Williams and two more in 1922 at Orono and Midhurst, but these initiatives came too late. Planting stock had been imported from the US and Europe. From 1904-1909 over a million white pine of German origin were imported, and with them came white pine blister rust. The disease, first documented in 1914, spread quickly throughout Ontario's white pine. Various approaches were used to address the issue but effective control measures were not found. Exploiting natural resistance, long-term breeding programs with other pine species were initiated with some success.

By 1907, research efforts were deemed necessary and the first Canadian Faculty of Forestry was started at the University of Toronto. In 1918, Canada's first forestry research station was established at Petawawa, Ontario, (now Petawawa Research Forest) to study the effects of logging, disease, and fire on forests. Also in 1918, Ontario's first growth and yield plot was assessed, marking the beginning of the monitoring phase of adaptive management.

In 1917, the need to suppress forest fires to save lives, property, and timber was recognized and the Forest Fires Prevention Act was passed. Unfortunately, wildfires that had promoted natural white pine regenerations were extinguished and further complicated efforts to manage white pine.

Silviculture effectiveness monitoring (SEM) was initiated in the early 1900s. In 1927, under a new Forestry Act, the province established a Forestry Board for "the purpose of studying all questions dealing with the problems of making the forest industries of this province permanent by securing of continuous forest crops." By 1939, reports of blister rust and weevil damage led to a recommendation that white pine not be planted in pure stands in eastern Ontario. In 1953, Dr. Hosie reviewed 58 regeneration studies that had been conducted from 1918 to 1951 and concluded that the methods used were not scientifically sound and that regeneration was not satisfactory. This led to more research and monitoring of

regeneration efforts to determine why some plantations failed and others succeeded.

In 1954, the Crown Timber Act was amended to include measures to ensure regeneration and maintenance of cutover areas, following debates about natural regeneration and failure to enforce standards. During ensuing years, the act was further amended to include promoting and maintaining productivity, clarifying area charges, adjusting dues based on timber sale prices, and initiating agreements with licensees. All of these amendments were the result of learning by doing - expectations were not being met so the approaches were adjusted.

By 1960, sufficient information had been acquired to warrant publishing the first provincial guide to white and red pine ecology, silviculture, and management. Since then, several subsequent comprehensive silvicultural guides for the white and red pine working group have been published. These guides synthesized information from multiple sources and substantially reduced the need for trial-and-error silviculture.

In 1979, Forest Management Agreements (FMAs) were initiated and the forest industry in Ontario was given the task of integrating logging and silviculture. This ended a long debate between the province and forest industries about who was responsible for reforestation efforts. Timber management also included management of habitat of featured wildlife species.

The latter part of the 19th century was marked by the passing of forest tenure and licensing policies and the introduction of stumpage and ground rents. By the end of the 20th century, forest practices and the importance of forests were recognized and management plans were required by law. Learning by doing was standard practice.

1994 -2006:

Crown Forest Sustainability Act

In 1987, international concerns about sustainability of global resources were being voiced. The Brundtland commission published its report *Our Common Future* and formally introduced the term "sustainable development". In Ontario, management philosophy began to formally embrace an ecosystem approach. In 1994, the Crown Forest Sustainability Act (CFSA) replaced the Crown Timber Act following recommendations of the *Class Environmental Assessment for Timber Management on Crown Lands in Ontario* (EA).

By 1997, adaptive management was officially recognized in Ontario following the publication of numerous forest management guides related to topics ranging from wildlife to recreation. This marked the beginning of a period of more formal learning and policies could be treated as hypothesis in a passive manner. Active adaptive management has not been used to manage forest ecosystems in Ontario.

In 1998, a new silviculture guide was released for the Great Lakes-St. Lawrence conifer forest in Ontario that reflects the principles outlined in the CFSA. Still in use today, it includes chapters on the importance of conifer forests to people, species ecology, tree quality, stand growth and yield, genetics, ecological foundations for silviculture, integrating timber and wildlife habitat, harvesting considerations, and management standards.

Not all of Ontario's white pine is managed using the silviculture guide. Several other management approaches are applied throughout the range of white pine, which provides opportunities for learning and for which results can be contrasted in future years. For example, Algonguin Provincial Park continues to be managed as a multi-use area. The Petawawa Research Forest is managed exclusively for research purposes. Other parks and protected areas exclude harvesting and wildfires; however, some have begun to prescribe fire to renew pine stands. Private lands are managed diversely and are not subject to Crown rules, offering even more opportunities for learning but, after many decades, the Crown still reserves the right to white pine, providing this species a degree of protection not afforded other trees. Quebec's zoning approach and recent ban of pesticides on Crown lands will provide additional, perhaps contrasting information to apply to Ontario's pine management. In addition, resource managers in Ontario often look to the US and overseas for new information.

In summary, evidence strongly suggests that adaptive management, or learning by doing, has been used in Ontario for the better part of the past century. To meet the intent of international agreements, such as the Convention on Biological Diversity, the Montreal Process, the Santiago Declaration, and the Kyoto Protocol, and to adjust to climate change, an active adaptive management approach will need to be used.

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WESTERN

SILVICULTURAL CONTRACTORS' ASSOCIATION

by John Betts

Do We Need a Silviculture Boss in BC?

In 2006 the silviculture contracting sector planted 280 million seedlings in BC. This is the third largest planting program ever undertaken in BC, and the third largest program of its kind in Canada. The number of seedlings planted exceeds the combined annual planting in the Scandinavian countries of Finland, Norway, Sweden, and Denmark. To put it another way, if the seedlings were planted every two metres in a straight line, the line would be 660,000 km long, equivalent to 14 laps around the equator. This is a very significant feat - an accomplishment for which nurseries, foresters, silviculture contractors, and their suppliers of services and products should stand tall and take credit for. It is an achievement that should receive broader recognition.

In my last column I opined about the absence of reliable figures regarding restoration and reforestation in BC. Since then some more numbers have been confirmed, like the ones above. But the problem isn't just that there aren't ready answers. The real problem is that so few people seem to be asking the questions.

I think what is bothering me is expressed in the following understatement from a recent special report by the Forest Practices Board, *Species Composition and Regeneration in Cutblocks in Mountain Pine Beetle Areas*: "Reforestation standards apply to individual harvested areas, and the reforestation of each harvested area is managed independently. As a result, the species composition of the young age class in a forest emerges from the species selections made by multiple foresters, each acting independently as they work to restock individual cutblocks. There are no requirements for, and few examples of, coordinating the reforestation of cutblocks to achieve a desired cumulative outcome for forest or landscape-scale composition."

This isn't the first time the Forest Practices Board has identified the absence of strategic landscape level planning as problematic. So maybe I am not alone in feeling like I don't know what is going on when it comes to our silviculture response to the ongoing assault on forest health. Nobody really is orchestrating a coordinated forestry strategy, so the kinds of figures and postings I am looking for don't have a natural place to reside. And as I said before, with results-based forestry, which might just become "laissez faire" forestry if we don't watch out, nobody really is asking.

One remedy to this problem might be to establish a Silviculture Boss equal in stature to the Beetle Boss. The same economy of scale (planning, infrastructure, etc) that has been used to expedite the salvage of MPB stands also needs to be employed for life after the beetle. There are opportunities for planting. There are opportunities for natural regeneration. There are opportunities for fuels management, fire suppression, and eco-system restoration. But an effective silviculture response requires a coordinated landscape-level plan. We need an aggressive silviculture response for timber values, hydrologic values, forest health values, and non-timber values. For this to happen someone in our elected government has to be curious enough to start asking questions; a quality of leadership. I am not sure that has been happening enough to date.

Corrections

In the November issue of Canadian Silviculture, we mistakenly noted in the Nova Scotia report that Don Cameron was writing on behalf of the Department of Natural Resources but the article is Don's own message and not that of DNR. Our apologies to Don and DNR for the error.

In the Managing Forest Carbon article in the November issue we printed a work in progress article rather than the approved final version of the article. The correct version can be seen on www.canadiansilviculture.com.

Our apologies to Stephen Kull and Ed Banfield for this oversight.

ONTARIO

FOREST RENEWAL CO-OPERATIVE INC.

by William F. Murphy, RPF General Manager

The Canadian dollar seems to be on the decline along with energy rates in Ontario. These are positives for our forest industry and should lead into more profitable times. Unfortunately, our losses will never be recovered. One of the superintendents that I worked with in the forest industry always commented that the cord of wood that you don't get cut today is a cord of wood left for the future, but it is a loss for the company. This is still relevant today. However, there is more to this than simply the loss of a cord of wood.

The trend for the past couple of years has been to reduce losses, and in some cases very drastically reduce the renewal trust commitment to the forest by some companies. The Ontario Ministry of Natural Resources has allowed (in some cases with no documentation that we can find from the District Managers) a constant yearly reduction of the companies' commitments to put in the renewal trust dollars that are going to allow for intensive forest management. They are in most cases meeting their commitment to regenerating the hectares promised, but they are reducing the effectiveness of this regeneration effort by allowing much more natural seeding to occur.

The new format for the Forest Management Plan has been increased to ten years from five, and although there are commitments within the process to review and account for progress within the plan, companies still have until the end of the tenth year to declare all the non-planted depletions to natural to bring the Crown's land to renewal status.

Within the mandatory Ministry compliance system, there are categories for auditing water crossings, roads, areas of concern, cut sizes, and suspended operations. All of these are audited against a specific area of the Forest Management Plan. There can be a significant amount of paper work and follow-up for any harvesting operation with respect to the accuracy and the completeness of a harvesting compliance report. For each block there can be more than one of the above compliance reports made up to a maximum of 500 ha, depending on the requirements within the five or ten-year compliance plan.

Where does renewal compliance fit into this system? By law one report is required to be submitted for each of the following - planting, scarification, thinning, and aerial spraying. There can be 5 million seedlings planted and one report submitted for the whole operation by the forest company involved. There is no physical measurement required within the compliance system to reflect the success or failure of the Silviculture Ground Rules or the Forest Operations Prescriptions for the individual blocks. There is no compliance report required at the end of the management term to reflect the success or failure of the reporting of natural regeneration. Yet we are depending on this to promote the success of our future forests. The OMNR is spending too much time and money on the past, after an area is harvested, and very little time and effort in promoting the future regeneration success of our Crown lands.

QUEBEC

ASSOCIATION DES ENTREPRENEURS DE TRAVAUX SYLVICOLES

par Audrey Harvey, Responsable des communications, AETSQ

Le Forestier en chef fête son premier anniversaire

En décembre 2004, la Commission Coulombe sur la gestion de la forêt publique québécoise déposait son rapport : un volumineux document de 307 pages contenant 81 recommandations. Parmi celles-ci, les commissaires proposaient la création du poste de Forestier en chef. Ce dernier serait responsable entre autres du calcul de la possibilité forestière. Parallèlement à cela, la Commission suggérait une réduction préventive immédiate de 20% de la possibilité forestière en attendant que le Forestier puisse valider les calculs.

Jusqu'à maintenant, le Forestier en chef, M. Pierre Levac, a dû monter une équipe pour relever le défi. Afin de répondre à la demande des régions, son bureau a été installé à Roberval, au Saguenay-Lac-St-Jean. Entouré d'une équipe de 32 spécialistes en calcul de la possibilité forestière, le Forestier a fêté son premier anniversaire en déposant son rapport faisant état des coupures envisagées pour la période 2008-2013. Monsieur Levac n'était pas peu fier de cette réalisation. En effet, il avait fait la promesse de faire connaître les résultats des travaux à l'intérieur de la première année de son mandat.

En tout, les analyses portent sur les 74 unités d'aménagement forestier (UAF) situées sur le territoire public québécois. Les calculs indiquent une diminution totale de la possibilité forestière moyenne de 21,9%, toutes essences confondues, confirmant à peu de choses près la réduction de 20 % recommandée par la Commission Coulombe. Il importe toutefois de décortiquer ce résultat pour bien comprendre la situation.

Au niveau du feuillu, une coupure d'environ 5% était attendue. Ce sont plutôt 15% qui ont été soustraits du calcul de la possibilité forestière, ce qui explique pourquoi la moyenne se rapproche tant du 20%. C'est dans le secteur du résineux que les choses se gâtent. En moyenne, les régions ont subi une baisse de 23,8% des possibilités forestières. Les régions les plus touchées sont la Côte-Nord et le Bas Saint-Laurent, qui subiront une coupure de 11,5% et 16,6% respectivement, en plus du 20% déjà annoncé, donc plus de 30 au total. Sur la Côte-Nord, les industries s'inquiètent de cette annonce. La compagnie forestière Kruger a même déjà fait savoir que cette annonce met en péril à la fois ses usines de la région mais également son usine de pâtes et papiers Wayagamack à Trois-Rivières. En effet, cette dernière est alimentée par le bois de l'Est du Québec. Il risque d'en être de même pour plusieurs autres petites scieries qui voient le tiers de leur approvisionnement disparaître.

À l'opposé, la Mauricie et les Laurentides s'en tirent avec une diminution moins importante que prévue de la possibilité forestière, en gagnant respectivement 4,2% et 13,4%, portant la baisse de la possibilité en moyenne à 15% au total pour chacune de ces régions.

Pour l'avenir, le Forestier en chef a invité les bénéficiaires de CAAF à faire preuve d'une gestion plus rigoureuse de la forêt en déclarant que « devant une tranche de pain, on ne peut pas manger uniquement la mie et laisser la croûte ». Il faudra faire un effort supplémentaire pour récolter le bois plus difficilement accessible et espérons que l'aménagement intensif de la forêt représentera la solution durable à ces coupures.

Welcome to New Readers from the Canadian Institute of Foresters

Starting with this issue, *Canadian Silviculture* is now being sent to every member of the CIF. While many CIF members have been readers for some time, not all know the magazine's history. In this editor's experience, *Canadian Silviculture* originated almost 30 years ago in 1977 with the formation of the Pacific Reforestation Workers' Association and its *PRWA Newsletter*. In 1982 the silviculture industry's focal channel for funneling those who are motivated to change perception and reality through writing and publishing divided for a time into the *PRWA Newsletter* and the *Western Silvicultural Contractors' Association Newsletter*, after PRWA coop members pressured the contractors out of the organization. But the *PRWA Newsletter*, which briefly became *Screef* in the 1980s, did not survive. In 1992, when the Canadian Silviculture Association was formed as an umbrella association for the regional or provincial silviculture associations, the *WSCA Newsletter* morphed into *Canadian Silviculture Magazine*, which became *Canadian Silviculture* in 2001 when EMC Publications started publishing the magazine.

Today's *Canadian Silviculture* no longer looks like the self-proclaimed "outhouse editions" of the PRWA and WSCA newsletters, but its readers and contributors continue to be those who work and live in the bush. Except for planter feedback blogs on the Internet and www.wsca.ca, *Canadian Silviculture* remains the foghorn for those who work in the bush and seek to change how we see and manage the forest. This does not mean you will only read about planting. As you can see, you will also read about bioenergy, climate change, and ecosystem dynamics. *Canadian Silviculture* is committed to debating the current drivers of change in how we see and manage our forests.

Enjoy!

Dirk Brinkman, Editor, *Canadian Silviculture*

by Audrey Harvey, Communications Coordinator, AETSQ. Translated by David Hayne

The Chief Forester Celebrates His First Anniversary

In December 2004, the Coulombe Commission investigating the management of public forests in Quebec tabled its report: a voluminous document of 307 pages containing 81 recommendations. Among the latter, the commissioners proposed the creation of the position of Chief Forester. This official would be responsible, among other duties, for calculating forestry yield. In relation to that function, the Commission suggested an immediate precautionary reduction of 20% in forestry potential while the Chief Forester was validating his calculations.

Until now, the Chief Forester, Mr. Pierre Levac, has been engaged in setting up a team to meet this challenge. In response to requests from the regions, his office has been located at Roberval, in the Saguenay-Lac Saint-Jean area. Surrounded by his team of 32 specialists in the calculation of forestry yield, the Chief Forester marked his first anniversary by submitting his report outlining cuts envisaged for the 2008-2013 period. Mr. Levac was pleased with this achievement, as he had in fact promised to make the results of his efforts known within the first year of his mandate.

On the whole, the analyses concern the 74 forestry management units (UAF) located on Quebec public lands. The calculations indicate a 21.9% total reduction in forestry potential when all species are included, roughly confirming the 20% reduction recommended by the Coulombe Commission. It is important, however, to break down this result in order to understand the situation properly.

On the hardwood front, a cut of approximately 5% was expected. Instead, 15% was deducted from the calculation of forestry potential, which explains why the average is so close to 20%. It is in the softwood sector that things are less satisfactory. On the average, the regions suffered a reduction of 23.8% of their total potential. The regions most affected are the North Shore and the Lower St. Lawrence, which will suffer cuts of 11.5% and 16.6% respectively, in addition to the 20% already announced, for a total of over 30%. The North Shore industries are concerned about this announcement. The Kruger forestry company has already claimed that this announcement puts its mills in the region at risk, including its Wayagamack pulp and paper mill at Three Rivers, which is supplied by wood from eastern Quebec.

On the other hand, the St Maurice and Laurentian regions escape with a less significant reduction of their forestry potential than expected, since they gain 4.2% and 13.4% respectively, making the average loss of yield 15% for each of these two regions.

As far as the future is concerned, the Chief Forester has invited those benefiting from the CAAF to give evidence of more rigorous forest management, saying, “When one has a slice of bread, one has no right to eat the soft part and leave the crust.” Additional efforts will have to be made to harvest less accessible wood. Let us hope that intensive management of the forest will provide a sustainable response to these reductions.

AGFOR REPORT

by Gaston Damecour, RPF

Specialty Forest Products

Increasingly, we are asked to incorporate a variety of non-timber forest values with timber values in our resource management strategies. The challenge then is to effectively implement a management strategy on the ground that gives fair weight to both timber and non-timber products. Black ash is an extraordinary resource of traditional significance and an excellent example of a specialty forest product.

AGFOR's exposure to black ash dates back to the 1980s and the potato basket makers of the Wolastoqiyik at Tobique, New Brunswick. The potato baskets - and other items like them such as hampers and backpacks - are sturdy, durable, working baskets. They are beautiful and exquisitely made.

The baskets are woven from strips of black ash that are produced by pounding a carefully debarked bolt lengthwise, and then lifting loosened strips of the black ash's ring porous wood. The strips are then soaked to make them pliable.

The front end of the supply chain is the black ash tree, which occurs individually or in small clumps in mature, tolerant hardwood stands. Ritchie says it is found "in organic or sandy soils along banks of streams, lakes and other wet areas, such as bordering swamps." Black ash is located in flood plains along streams of wider ravines, ranging from the southeastern Manitoba pinelands through southern Ontario, Quebec, New Brunswick and Nova Scotia. It is the only member of the ash species found in Newfoundland and Labrador.

Black ash is rarely identified - or even recorded - and usually ends up classified as other hardwoods. As such, it is not listed in the stand and stock tables.

The next challenge is to treat black ash silviculturally. The first step is the rapid identification of the tree in a production environment. To the untrained or unsuspecting eye, these trees are treated as another ash or hardwood.

This is where Krista Sockabasin enters the picture. Krista is an undergraduate in the Faculty of Forestry and Environmental Management at the University of New Brunswick. Using occurrence data, site characteristics, and harvest data from traditional harvesters Tobique First Nation, she has been working on a predictive model of black ash potential. Ed Swift of the CFS says the model has proven to be reasonably accurate at locating, even at a sub-stand resolution, potential black ash habitat.

Most of the criteria are already found in digital resource-management data sets. Other data such as water table and moisture regime information can be incorporated into most GIS databases.

What is remarkable is the predictability and resolution of occurrence. A GPS could alert planners, field layout workers or operators to be on the lookout for black ash and to adjust the treatment regime in that area. From the habitat description, black ash should occur in stream buffers that are typically subjected to partial removal of the merchantable volume. This shelterwood style of intervention is very compatible with the black ash's gap replacement regeneration regime.

Dr. Charles Bourque of the CFS developed the initial model and he is continuing work with other species. The significance to the silviculture industry is the ability to predict - or at least alert - planners and operators to a possible need to adjust the treatment for black ash and, ultimately, for several other species.

The role of the silvicultural operator in maintaining and hopefully enhancing a site's diversity is one we should anticipate and welcome.

Gaston Damecour, RPF, NB & NS, is the principal of AGFOR Inc, a forestry business consulting firm based in Fredericton. He can be reached at 506-462-0333 or gdamecour@agfor.nb.ca.

by Alan O'Brien

Crop Tree Pruning

One of the newer silviculture treatments in Nova Scotia is crop tree pruning. This operation involves removing the lower limbs/branches from the bole/trunk of the selected crop tree. Manual or motorized saws can be used. This is a quality or value added treatment, which promotes growth of clear timber on selected trees. The end result at harvest would hopefully be a veneer product.

The pre- treatment stand qualifying standards are a 8m height minimum and greater than 125 of the prospective pruning species per hectare. The prospective pruning species include two conifers (eastern white pine and red pine) and five deciduous species (sugar maple, northern red oak, yellow birch, white birch and white ash). There is interestingly enough no maximum age or height restrictions set down by the provincial department of Natural Resources.

The post treatment stands are to contain less than 125 trees per hectare of the previously mentioned selected species, pruned to a height of 5m. The same area can be treated at ten-year intervals if enough of the prospective species remain in the stand. In theory a fully stocked pure white pine could be pruned every ten years for two centuries depending on mortality and densities.

Most naturally occurring mix wood stands would not present an opportunity for this many interventions due to the lack of selected species. Sugar maple form pure stands in NS and are long-life trees. These stands would also present the opportunity for many pruning interventions.

The trees being selected for pruning need good form (straight bole), must be free of natural defects, and be located in a free to grow location. The persons carrying out the pruning need to be able to discern the different tree species in all seasons. Hence oak gets pruned and aspen does not. The prospective trees to be pruned should be the trees with the smallest limbs and fewest.

When pruning in young white pine stands (8-10 m) it is more ergonomic to prune numerous stems in close proximity. Space and range of motion is increased as limbs are removed from trees.

This silviculture treatment is a fairly easy sell to private woodlot owners with little disturbance to the stand being treated. Their only complaint was the number of trees that were pruned, since they would have liked more treated.

PEI

DEPARTMENT OF AGRICULTURE & FORESTRY

by Ken Mayhew

New Forest Policy Released

In October, the province of PEI released its new forest policy, entitled *Moving to Restore a Balance in Island Forests*, to the public and forest community. This document replaces the 1987 forest policy and will guide government's role in the management and conservation of public and private land forests. It is based on extensive public and forest sector consultations and takes into account the many values Islanders place on their forest lands. This policy recognizes that forests are more than undeveloped lands or a source of timber, and that healthy forest ecosystems are essential to the Island's economy, society, and environment.

Unlike most of Canada, the majority (88%) of PEI's forest land is privately owned. Owners are responsible for making their own management and harvest decisions. While most private land operations tend to be small in size, collectively they can have a major impact on the health and productivity of Island forests. As well, the Island's ownership laws prevent corporations from owning more than 1200 ha of forest, so the Island's forest harvesting and processing sectors tend to be small and relatively minor players in the provincial economy.

With these factors in mind, the new forest policy clearly recognizes private landowners' right to make their own land use decisions. The province will continue to support woodlot owners who want to manage their forest resources, however, the policy includes actions to ensure that public funds lead to public benefits. In the near future, approved forest management plans will be required before land owners can access public funding. As well, financial support will shift away from the current ratio of 90:10 in favour of softwood plantations to a 50:50 balance between plantations and alternative, enhancement-style treatments. These actions will be phased in, starting next year, to allow those who use the programs time to adapt.

This shift in funding emphasis, combined with a commitment to increase education and training opportunities for woodlot owners, will help Island landowners manage forests for a wider range of products and services. One area that holds great promise is the expansion of value-added forest products such as flooring, furniture, cabinets and giftware as well as non-timber products such as foods, decoratives, and medicinals

The new forest policy emphasizes the role of public forest lands in education, research, and demonstrating good forestry and wildlife management practices. Action items in the policy include creating a public land atlas, developing an ecosystem-based forest management manual for public land, and building government/community partnerships. These actions will help ensure that public lands set the standard for stewardship and conservation,

PEI's new forest policy also takes into consideration the potential impacts of climate change. In response to this issue and other actions in the policy, the J. Frank Gaudet Tree Nursery will increase production of late successional Acadian forest tree species for enrichment and enhancement plantings.

Moving to Restore a Balance in Island Forests is available online at www.gov.pe.ca/go/forestpolicy, or by calling Island Information Service at 902-368-4000 or 1-800-236-5196.

Focus on Safety

by Bill Bolton

Faller training that's literally a cut above

Anyone falling trees for a living in BC must be certified by the BC Forest Safety Council in order to do the work. Most people first think this legal requirement applies only to production falling, but silvicultural falling is also included. If your silviculture project involves falling trees at least six inches in diameter, it stops being simple silviculture. Whoever does the job must hold a faller certification; nothing else will satisfy regulations of WorkSafeBC.

What does this mean in practical terms?

On the ground, where the work needs to be done, employers should be sure that fallers carry valid log books and wallet cards. The logbook documents where and for whom each faller has worked, and in what kinds of timber and terrain. The wallet card specifies the faller's qualification level in terms of allowable tree diameter and maximum acceptable degree of slope. Both criteria are established by certification test results.

There are no substitutes for these legal proofs of certification and experience. Until recently, fallers could earn them in three ways - being certified in a grandfathering process, passing challenge tests open to experienced fallers, or successfully completing a program under the BC Faller Training Standard.

More and more, however, new certification holders will largely be newly trained fallers. This is because most experienced BC fallers were grandfathered, a process that ended last summer, or have already taken the challenge tests.

Future fallers will enter the workplace through programs using the provincial faller training standard that was developed jointly by the Council, the forest industry, labour, and WorkSafeBC in order to replace a chaotic and uneven mix of both effective and seat-of-the-pants training programs. Until the current system took hold, no one could depend on consistently safe work practices. In a few cases, "training" involved little more than handing chain saws to green fallers and sending them into the bush.

Modern fallers need to be professionals who apply uniform work standards taught

B.C. Forest Safety Council faller trainee, Eric Sigurdsson, falls a tree with the help of Qualified Supervisor Trainer Steve Telosky at a worksite near Port Alberni. Photo courtesy of Niomi Pearson.

through a combination of comprehensive training and on-the-job performance. This is the reality now in our province. It is intended to foster, with a best-practices approach, three key characteristics in BC fallers:

- Recognizing hazards and completing a risk assessment of each situation before making any cuts.
- Continuously working to improve personal workmanship.
- Finding qualified assistance when you need help or are uncertain of your abilities.

The means for this training and experience comes through the Council's new faller training program, consisting of five days of classroom instruction, 25 days of field training, and up to 180 days of supervised work experience.

The bottom line is that we're teaching fallers to arrive mentally and physically equipped to work safely and productively, so everyone goes home in one piece at the end of the day.

Bill Bolton is senior advisor for Forest Worker Development at the BC Forest Safety Council, which oversees all Council training in the province. More information on these and other Council programs is found at www.bcforestsafe.org.

B.C. Forest Safety Council faller trainee, Ryan Sampson, prepares a tree for falling at a worksite near Port Alberni. Photo courtesy of Niomi Pearson.

CERTIFYING FALLERS IN BC

Two paths lead to the certification required to fall trees in BC. Those new to the forest industry must complete the requirements of the provincial faller training standard, while experienced fallers can challenge the standard. Here's what is available.

TRAINING

As we go to press, enrolments remained open for the following sessions scheduled in June 2007, coordinated for the BC Forest Safety Council by Malaspina University-College:

- Port Clements on the Queen Charlotte Islands for classroom instruction; field training site to be arranged
- Parksville for classroom instruction; field training site to be arranged in the Port Alberni area

For information on these and future offerings, contact Marion Knost at Malaspina University-College at 250-740-6364, or email her at knost@mala.bc.ca.

CHALLENGE

Experienced fallers can challenge the faller training standard by completing an initial skills assessment and passing a written test and a field certification test.

Those ready to make the challenge can obtain more information from Gary Banys at the Council's office in Nanaimo at 250-741-1060, 1-877-741-1060, or banys@bcforestsafe.org.

BIOMASS FOREST MANAGEMENT:
TALLOIL CASE STUDY

by Brian Menzies

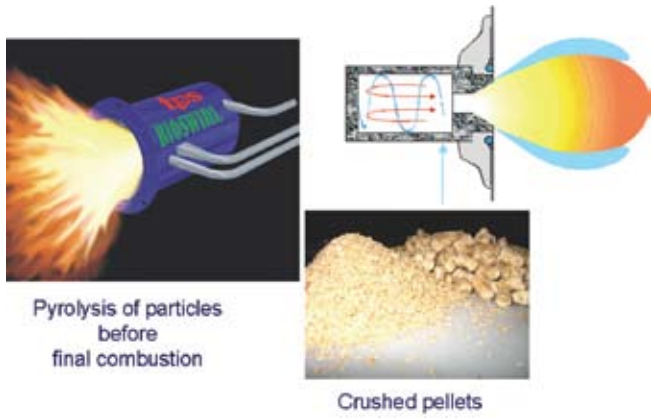
Biomass energy products, such as wood pellets, are becoming a global commodity. The pellets are considered an excellent substitute for fossil fuels such as coal, and will become a problem solver for the mountain pine beetle (MPB) disaster in BC's forests.

Wood pellets - a form of biomass derived from wood fibre - are touted for both their sustainable and environmental characteristics. The pellets can be burned in residential wood stoves or in large, industrial, thermal power plants. The biggest advantage over fossil fuels is that the pellets reduce greenhouse gases by 30%, meeting the European Union emission targets.

While biomass energy has great environmental benefits, it also provides an opportunity for better forest management. TallOil Canada is making a large investment in BC to produce wood pellets and help rehabilitate the MPB- damaged forests, help reduce the threat of forest fires and better utilize wood waste while developing a new environmentally-friendly and sustainable energy product derived from our forests.

Four years ago, Henrik Lundberg, a Swedish bioenergy expert and founder of TallOil, and BC-based forestry engineer Clay Anderson joined to develop a proposal to make industrial wood pellets from round logs. Most people they talked to did not believe this was economically feasible in BC. Although wood pelletization already exists here, these operations mostly manufacture wood pellets from sawmilling waste for the domestic market. Four years later, energy prices have risen and the MPB epidemic has grown exponentially, generating a much stronger interest within BC to explore biomass opportunities.

Last year, TallOil Canada Inc. won four timber licenses. The total volume awarded was just over one million cubic metres per year. TallOil intends to develop four pellet plants that convert round wood into pellets. Its investment will be over $160 million and it will be employing over 600 people throughout the interior region, which has been heavily damaged by the MPB epidemic. TallOil will manufacture industrial-grade wood pellets for the European biomass energy market or develop biomass energy opportunities here in Canada.



The BioSwirl™ Burner volatilizes powdered pellets using pyrolysis and then burns the char and bio-oil

Four of Tall Oil's 25 Mega Watt burners, manufactured by Varnetesnisk Service, one of Sweden's foremost wood-powder burner manufacturers.

TallOil is well suited to develop wood pelletization in BC since they have a long history of developing bioenergy products and combustion technology in Sweden, and later in Europe. It is a leading bioenergy company in Sweden, where 25% of the national energy needs are derived from bioenergy products. It develops products such as bio-diesel, ethanol, and solid biofuel products from agricultural and wood waste. It also provides logistical support including shipping and its own port for distributing its products. TallOil, through its subsidiaries, TPS Termiska Processer AB and VärmeTeknisk Service AB, specialize in combustion technology that enables the use of biofuels without major modifications or replacement of existing furnaces and boilers. TallOil is an innovative, vertically integrated company that is actively participating in the development of biofuels and renewable markets, and the resulting improvements to the environment.

The bioenergy market demand is very strong in Europe. Electricity production from solid biomass has increased markedly between 2004 and 2005 with a growth of 16% (an increase of 6.1 TWh [one thousand Giga Watt hours] from a total of 44.1 TWh). Europe's strong demand for biofuels is currently driving producers to look to other continents, including North America, as a supply source.

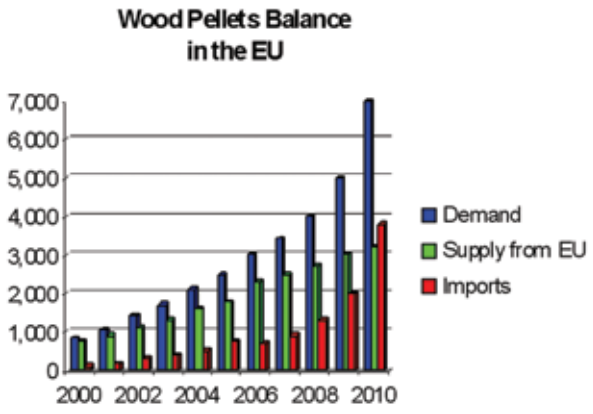
Although there is a vibrant European market for biomass wood pellets, there is a good potential to develop BC's bioenergy industry. TallOil is looking for energy opportunities here and they are working with the provincial government in developing the new bioenergy strategy, whether through electrical generation, co-generation opportunities or development of district heating. Until there is a market for bioenergy products in the province, TallOil will continue to develop its biomass products for distribution to the highly active European bioenergy market.

Biomass energy products help pulp mills and wood manufacturers to improve their production and wood products utilization. Most people believe the by-products such as sawdust or wood chips generated from wood manufacturing are the only means for manufacturing wood pellets. In TallOil's case, it has a patent technology that will convert round logs to wood pellets. This means that TallOil will be able to extract logs from the wood supply chain that are either left behind during harvesting or sorted before the manufacturing process. When poor quality fibre is removed for biomass production early in the supply chain, pulp and sawmilling production

UK Utility 4x500 MW_e 4x1350MW_{th} Coal with 2x6x25MW_{th} Wood Pellets Bioswirl

Tall Oil Stora deep sea pellet port in Vikka Harbour

Example 10 MW_{th}



moves more efficiently, with a higher percentage of desired log inputs. This is very important as most interior sawmills are having increased difficulties processing MPB-damaged fibre.

More importantly, sourcing fibre from round logs can help rehabilitate BC's forests. The Crown forests have large areas that will not be harvested by the conventional harvesting industry. This is largely due to the decaying MPB-damaged stands that are not suited for pulp or wood manufacturing. There is also a large area within the inventory identified as problem forest types such as overstocked, over-mature, non-contributing forests. The government must undergo a costly program of forest removal and reforestation to convert damaged forests into productive forests contributing to the timber harvesting land base. The Crown's costs to rehabilitate these forests are estimated at $5,000-$10,000 per hectare.

TallOil believes that the best solution to this looming Crown liability is to harvest as much round wood as environmentally possible for wood pellet manufacturing. With its current licenses, TallOil plans to treat up to 12,000 hectares per year that will contribute to the allowable annual cut and help to offset the future harvesting decline.

The large fuel loads after decades of fire suppression activity in the forests is now threatening rural communities. The conversion of round logs to wood pellets can help to reduce the risk of interface fires by removing low value fibre that is the primary contributor to fire hazard. Even after wildfires, damaged forests that are not salvageable for lumber production can be converted to wood pellets and efficiently rehabilitated. These opportunities will ensure TallOil is committed to pellet production and forest management in BC even beyond the current MPB epidemic.

TallOil Canada is currently seeking locations for its wood pellet plants. The company is also developing its harvesting plans. Along with their existing licences, TallOil is working with other forest companies and First Nations for opportunities to acquire more fibre. This will ensure that biomass wood pellets will not only provide rehabilitation opportunities for its own licenses but for others as well.

Biomass wood pellets are helpful for our environment not only as a renewable energy source, but also for helping to rehabilitate our forests.

Brian Menzies is Public Affairs Consultant for TallOil Canada Inc. at www.talloil.ca and President of Direct Public Strategies, Inc.

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