



CANADIAN
SILVICULTURE

Winter 2003

COVER STORY

Dothistroma

In This Issue
Australian & U.S. Silviculture
Forest Health
Carbon Credits & Afforestation

Kitty Ypma
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ON THE COVER:

Dophistroma

This 55 year-old stand of lodgepole pine is suffering from Dophistroma needle blight
 by Alex Woods

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Editorial

Dirk Brinkman, Editor

Reversing Adverse Economic Trends

In much of Canada, silviculture earnings have declined in the past two decades and in the last decade silviculture jobs have declined. These declines have been blamed variously on low bidding, bean counting purchasers, unsustainable government funding, low-ball contractors and even the happily unorganized work force.

In fact, income and employment trends matched the downward trends for incomes and employment across rural North America, especially in natural resource sectors and the current world economic down cycle is pushing silviculture earnings and employment still lower.

The resource renewal sector decline of earnings in real dollars trend however, is neither inevitable nor irreversible.

In 1987, after stocking standards for all ecosystems were established across BC, industry was made accountable to reforest all areas logged. During the following decade, income for experienced professionals in reforestation did not follow the general earnings decline in the natural resource sector. Managing foresters valued the quality of silviculture service, creating a high demand for experienced silviculture workers with micro-site quality skills. This kept their real net cost per hectare of establishing free growing stands down without reducing planters' real earnings. Alberta set in place a similar policy in 2001, though with lower stocking standards, and also arrested some of the decline in the skilled silviculture labour price trend in the rest of Canada.

Ontario however, while it made reforestation an industry obligation in 1996, did not recalibrate its generic 1981 stocking standards to the forest

ecosystem classifications developed across its forest lands in subsequent years. Since 1996, the Ontario government instead permitted a joint industry/government committee to negotiate, deadlock and reinvent itself without conclusion.

Ontario IWA rates for tree planting have been a perfect mirror of the declining trend in rural wages over the past two decades. Last negotiated in 1981, seedling prices remained static for 21 years. Real seedling prices decreased with inflation each year until the 2002 fall negotiations, when the seedling prices were increased 1 cent over two years. While forest company's with IWA agreements will likely honour the new tree price adjustments, these costs do not



seem affordable in the face of some of Canada's lowest real lumber prices and highest US lumber tariff barriers. Higher stocking standards seem even more unaffordable.

Ontario forest licenses now manage to the forest unit, recreating the harvest stand mosaic. This means they generally replace marginal stands with marginal stocking, and high value stands with high value and density stocking. Ontario's extensive poor quality second growth is a low standard to regenerate

to. Consequently, the program is not regenerating to the value and volume potential of every site.

Of course, establishing minimum stocking standards without incentives and rewards is not affordable. But because higher stocking will result in higher future volumes, increases in harvest volumes can be scheduled. On extensive forest license areas with suitable age class mixtures, harvest increases can be scheduled into the near future.

In the past six years Ontario, unlike BC, converted all of its forest licenses into area-based licenses. If the government set minimum stocking standards in each ecosystem it would capture some of the potential to grow Ontario's forests. In exchange for meeting these standards, licensees would get that extra volume scheduled into their future harvests. Not just for Ontario, this is also the next logical silviculture step towards sustainability for forest licensees in BC, Alberta and the rest of Canada.

Incentivising growing the forest in exchange for giving the increased volume to the licensee for funding the silviculture investment can create the next wave of demand for professional silviculture services.

It is not only the time to act because today's professional silviculture workers are among Canada's true heroes and environmental pioneers and deserve earnings that trend against the declines of rural incomes. It is time to capitalize on the unique skills and experience of the professionals for the benefit of growing Canada's forests. Otherwise we risk losing the best people to the continuing trend of reducing seedling or hectare prices, and increasing the net free growing cost for creating value and volume.

Letters to the Editor



I like your magazine. We need more classified advertising for job creation and more talk from real silviculture - the forestry worker. Contracting is a big business but I have noticed that everybody is underbidding so the workers are still working like animals. Wages never went up in the 25 years of my career and they even went down!

Now with newer machines, the production goes up so then contractors can bid even lower. The big corporations make more money and we make less.

In Canada, is it no wonder that the USA whines about subsidies in forestry, when we give our forests away for the lowest price, with cheap labour costs? Now mills are closing. Wasn't that predictable?

No more logging = no more silviculture. In Quebec, it's all subsidy by volume quote. No volume = no silviculture. It's already started where I live. This is the wake-up call! Increase the life standard of forestry workers, increase the pay cheques, pay exploitation costs and production bonuses, etc. Increase the cost and make them stop being cheap. Because I'm not the only one who will quit the business.

Laval Bergeron, St. Andre L.S.J. Quebec

I'm a fourth generation forester living in Bainbridge GA, near my family's forest holdings. In the early part of this century, my ancestors acquired tracts of abandoned land. My family has been committed to being good land stewards. As the times changed, we have changed the way we managed the forest. We changed from turpentine production to lumber production, from hunting leases to pulpwood production, and from the production of pine needles to the careful management of certain wildlife species.

We have conducted regular, low intensity burns in most timber stands, on a semi-annual basis. One of the benefits of this practice is a significant reduction of the fuel load, thus providing some protection against catastrophic wildfires. This tradition may prove beneficial in certain regions of Canada.

Four generations of careful, stewardly management style has created values far and above the value of the lumber on the land. The land has been managed in a way that has created a treasure not only from a timber production point of view, but also as seen through the eyes of any conservationist.

Nobody knows how these lands will be sustained profitably in future years. For now, it is our responsibility to manage the land with the utmost regard for proper stewardship, and be flexible when other needs and opportunities arise in the future.

Joe Livingston, Bainbridge GA

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Australian Silviculture

by Tim Cadman

Australia is destroying trees faster than any other developed nation and is now fifth in the world in terms of land clearance. Over a million hectares of woodland have been cleared in the last three years, 80% in Queensland. Clearance of old growth forests and other native vegetation for replacement by plantations of radiata pine and Eucalyptus is also occurring in Tasmania and to a lesser extent in other states. Of the 564,000 hectares of forest cleared in 2001, three quarters was in Queensland.

Australia's 7.5 million sq. km. is only 5% forested, and most forests are dominated by the genus Eucalyptus, which is found in the tropical, subtropical and temperate zones. The majority of forests (excluding tropical savannah and open grassy woodlands) are located along the escarpment of the eastern seaboard's Great Dividing Range, south-west Western Australia and on the island state of Tasmania (south-eastern Australia). Fifty per cent of Australia's biodiversity is found in its forests.

The dominant forestry model used on public and private land is that of "clear-felling", whereby forest management units are almost completely cut over and subsequently regenerated by fire. There is some selective logging in drier forest types, and different states use different management guidelines. Approximately 70,000 hectares of forests are clear-felled on public land every year, with approximately the same amount logged on private land. The predominant forest product is woodchips, which are exported largely to Japan for paper production by companies including Nippon Paper, Mitsubishi Paper Mills and Nippon Unipac. Approximately 8 million tonnes of woodchips were exported in 1998, comprising roughly 70% of the country's forestry production.

The historical context for plantation development

For many years, the conservation movement fiercely opposed the alienation of large areas of native forest for the establishment

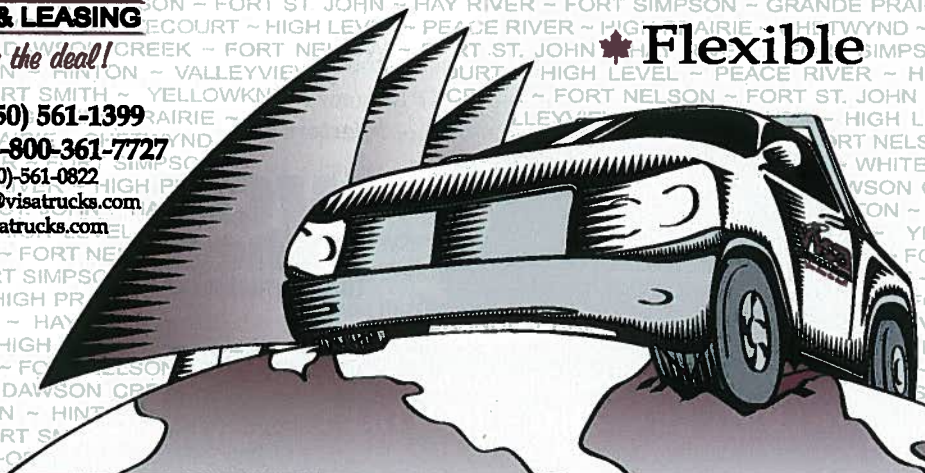


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of pine plantations. It perceived that there was a large environmental cost to pay for the alienation of such large tracts of country into single species or tree farm monocultures. However, by the mid 1980s, the realisation came to many involved in forest conservation that the price that had been paid in terms of the loss of native forest ecosystems shouldn't be wasted.

In 1988, the Australian Conservation Foundation proposed a transition from native forest logging to a wood products industry largely based on extant pine, together with the development and articulation of a strategy for pulp production on short-rotation eucalypts. The largest obstacle to the realisation of this strategy has been the general dislike in the Australian community for Radiata pine, a dislike that in large measure has been engendered by very potent, powerful and emotive conservation campaigns, and the desire of industry to maximise its potential land base in native forest.

In 1992, the National Plantation Advisory Committee looked at the environmental costs and benefits of plantations. One area examined was why Radiata pine came to be planted in preference to Eucalypt.

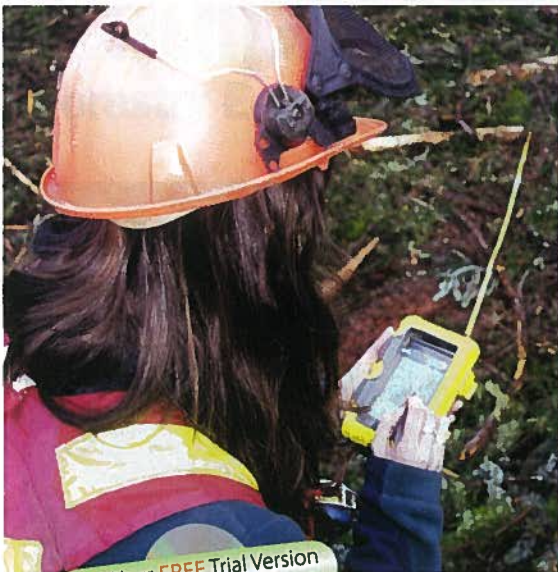
The reason was due to a decision made in the 1960's. The belief that the world was running out of softwoods led everyone to plant softwoods. Australia was relatively lucky that it was landed with Radiata pine, a species that came from a really small geographical distribution around Monterey, on the west coast of North America. Australia doesn't have any members of the pine family so genetic cross-species fertilisation was not a problem. Although there's a potential for these trees to become environmental weeds, their appearance makes them easier to

distinguish than eucalypts. While they do not provide the best of habitats, they certainly offer more than a field of carrots. The very fact of how isolated they are from their native ecosystem has reduced insect predator problems, except for the Sirex wasp, which has largely been managed by good stand management and correct decisions about site selection.

The 2020 vision for plantations in Australia is an initiative by the Commonwealth and State Governments in the National Forest Policy Statement (1992), and by the Commonwealth Government in the Wood and Paper Industry Strategy (1995). The Target, to treble the effective area of Australia's plantations between 1996 and 2020 is supposed to be achieved by planting an average of 80,000 hectares a year. This will add 2 million hectares to the 1996 plantation estate of a little over 1 million hectares, which comprise roughly 90 per cent softwood and 10 per cent hardwood. Australian governments and industry collaborated to attract the private investment necessary to develop a significant plantation resource. The development of both softwood and hardwood plantations is designed to complement the production of wood from native forests managed on a sustainable basis through Regional Forest Agreements.

Plantation Management: Problems and Alternatives

Like all agriculture, plantations suffer from a major set of problems associated with the long-term maintenance of site productivity. In some instances in Tasmania, at the second rotation, site managers are still bulldozing the bits left over from the plantation harvesting into heaps and burning them. According



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to the National Plantations Advisory Committee and all the relevant sources, there's a heap of evidence that maintains that "wind row" burning is a very bad idea. What's more, there are alternatives to that approach - one of which is called chopper rolling - where the logging slash is broken up on the soil, and the next rotation is planted through it. This maintains the organic components of the slash on site.

Plantation managers will often say that their sites are too steep and that they must keep slash burning. What they're trying to say is that they've made a bad decision about where they've put the trees in the first place and they're not going to manage these sites sustainably. There are obviously areas within the plantation estate that are going to have to be managed differently. They're either going to have to be put in long rotations or will have to be taken out of production completely, and restored to whatever simple but functional level that can be achieved.

There is also a need to designate areas where wood production, or any kind of agricultural production, is appropriate but where ecosystems can be worked on to restore some level of environmental functionality. In the latter case, it is certainly unfair to integrate farming with forestry and then once the trees are fully grown, to insist the trees stay, since the landscape has been restored.

In terms of sustainability, how are these mono-cultural plantations to be managed as better farms? Current chemical use in plantation forestry in Australia is problematic. Australia is still using triazines for example, the most well-known of which is Atrazine. Both are hazardous; they move through the environment very easily and they're also environmentally stable, so they last a long time - are highly soluble in water.

There are other chemical alternatives. The herbicide, glyphosate, for example, is a far better option: there are problems with it, but it's far safer than any of the triazines. There are even alternatives to some of the pesticides used in the eucalypt

plantations, like the naturally occurring pyrethrum. Scientists have also developed a strain of bacillus which is active against the main leaf-eating beetles.

Much more encouraging is the growing development of completely alternative systems dispensing with chemical use all together. Wool mats, dry mulching, steam treatment of weeds and in agro-forestry, grazing, are just some of the alternatives available. More work needs to be done in this area.

Streamside management

Plantation impacts can also be reduced by better management of riparian zones. In the United Kingdom, it's now standard practice to plant buffer strips with native species to act as native corridors. There's no reason not to do that in Australia. There needs to be an enforceable set of guidelines or codes of practice for the establishment and maintenance of plantations.

Agro-forestry

Use of windbreaks are good for farms because they increase productivity, well above the land area lost in putting them in. A three-tier wind break will grow a sawlog in the middle and pulpwood on the outside with maybe a short log in it.

The National Plantations Advisory Committee investigated the potential for the farming of small wood lots in north-west Tasmania. It concluded that within ten to fifteen years it was possible to grow a world-scale pulp mill-size resource, by taking 10% of the land out of potato and onion production and putting it into trees. This would in fact increase the productivity of those crops by providing shelter and other benefits - and give the farmer an extra lucrative resource. ♦

Written by Tim Cadman. Compiled from various sources found under <http://www.nfn.org.au/>



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American Silviculture

by Arne Aiking

I worked in the Canadian silviculture industry as a forest seedling nursery equipment supplier and then grower for fourteen years. In the last four years, I have been growing forest seedlings in Alabama. This article reflects some of the trends and developments in silviculture in the US and the reasons for some of their differences from the Canadian program.

It comes as a surprise to most Canadians that America plants over 2 billion seedlings per year — over three times as many as Canada.

Following are some regional comparisons:

Province/State	Size (sq. km.)	Seedlings Planted Annually
Ontario	907,116	100 million
Georgia	148,273	207 million
BC	914,447	200 million
Washington	170,450	100 million

Tree Planting Season

80% of the US seedling production is concentrated in the Southern States, where bareroot production is still firmly entrenched. Veteran tree planters in Canada may recall that bareroot seedlings can only be planted when those seedlings are dormant. Therefore, tree planting in the South, essentially means tree planting in the winter months.

Some larger American tree planting contractors employ their crews in places such as Washington, Oregon, Michigan and Minnesota in the spring and fall, and employ their crews in Florida, Georgia, Mississippi and Alabama in the winter months.

Planting Crews

In Canada, the seasonal nature of the work makes tree planting and University students a natural fit. Because the planting season occurs predominantly during university semesters, most American tree planting contractors work with crews of migrant

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farm laborers. These are primarily people from Central America, who work on farms in the spring, summer and fall, and who plant trees in the winter months.

Planting wages and costs tend to be lower than in Canada. As in Canada, much of the work is based on piecework, with a government mandated minimum hourly wage basis, depending on the State. Some private landowners may give the contractor a lot of leeway as to how workers are compensated whereas governmental landowners tend to stipulate the minimum labor compensation requirement for their contractors.

Tree Seedlings

In Canada, 89% of all tree seedlings are container seedlings. That percentage is roughly similar to other countries with a well developed silviculture sector such as Brazil (87%), Sweden (79%) and South Africa (96%). In the US, only 6% of all seedlings are container. What follows are some of the possible explanations.

Land Ownership Structure

Aside from some private ownership in BC, Quebec and the Maritimes, the majority of forestland in Canada is owned by the provincial governments. The license holders often form large areas of defacto silvicultural responsibility. In the US, the land ownership structure is much more European in its nature: The American constitutional rights to private property won by the revolutionary pioneer have produced hundreds of thousands of small land holdings.

This fragmented ownership structure forms a considerable barrier to new technologies such as container seedlings. When Canada switched from bareroot to

container seedlings, I provided a cost benefit analysis to educate a Customer. Once the results were clear, we could expect to sell that Customer three million seedlings every year. Here in the US South, if I manage to convert one landowner, I might sell him 12,000 seedlings this year, and maybe another 12,000 seedlings 35 years down the road.



Fragmented landownership in the US thus impedes the introduction of new silvicultural technologies. We can see the same inertia at work in harvesting systems: skidders and other primitive harvesting systems still prevail.

The concentrated land management structure in Canada, despite all its problems, has facilitated rapid silvicultural progress. Some would argue that the rate of progress has in some regards surpassed silvicultural progress in the Scandinavian countries.

Bareroot Nurseries

Bareroot nurseries in the US are traditionally owned and operated by State Governments and forest companies like International Paper (IP). Those nurseries are large and efficient—IP alone produces 400 million bareroot seedlings—and so have a low per seedling cost. They have grown to such an immense size partially

through meeting their own needs and by effectively monopolizing the fractured local small landowner markets. Landowners tend to maintain a strong working relationship with companies that may purchase their timber, once it is mature, and each one of those companies responds with various “landowner assistance programs”.

Small landowners represent a formidable voter influence group in forestry states. State governments and the integrated forestry companies who depend on these small landowners for their wood supply have evolved a series of reforestation grant and subsidy programs. Private landowners tend to be in regular communications with forestry companies and State Governments for reforestation advice to qualify them for these various government

reforestation subsidy programs.

These large bareroot nurseries are integral to the forestry research groups and concentrations of other forestry expertise which form large state or integrated forest company bureaucracies dependent on the tax and grant programs. Researchers who are dependent on corporate funding will come to biased conclusions: Researchers at Auburn University recently concluded that bareroot seedlings are a more reliable option for landowners than container seedlings. The inertia of this integrated bureaucratic tangle makes introducing change improvements like container seedlings very difficult.

The large bareroot nursery’s operational objective is simply to make seedlings available to landowners at the lowest possible costs, and not to make profits. Success is measured by the number of seedlings shipped.

Reforestation costs are still measured by the shipped seedling from the nurseries rather than by the cost per free growing tree.

Containerized Nurseries

Consequently containerized nurseries in the US tend to be small and have historically been owned and operated by people who draw a salary elsewhere. These operations lack technology and quality assurance programs and have had considerable crop failure rates. Landowners in the US who have received consistent quality product from large professional bareroot nurseries have

been disappointed with the developing products from small containerized tree nursery operators. As a result landowners still view containerized seedlings as "experimental".

Pesticide Legislation

Various provinces in Canada, following the lead of BC and Quebec, have instituted stricter rules on application of herbicides in the forest. This has created a demand in Canada for seedlings that are stronger and planted better. "Microsite Selection" has become part of the tree planter's vocabulary in Canada.

In the US, depending on the State, legislation is still quite loose. "We can plant cheap bareroot seedlings and release the tree from herbaceous competition cheaply with herbicides."

While this allows field foresters in the US some freedom for now, we can see that



more and more States, with the Pacific North-West in the lead, are implementing stricter pesticide policies, which in turn creates an emerging demand for stronger seedling growth from professional tree nurseries and planting contractors.

Developing certification processes may also stimulate demand for more reliable silvicultural methodologies.

Forest Land Ownership Changes

Because of the predominance of private forest land ownership in the US, integrated forest companies have acquired large parcels of private forest land on which their timber supply depended. Over the past couple of decades, forest economists analyzing the return on investment from the ownership of these large parcels discovered that the return on investment averages 14% which is better than most

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other investment options for pension and insurance funds. Through the influence of these forest economists, insurance and pension groups have invested over eight billion in forest land, retiring American forest company debt (cit. the recent sale to Hancock of some of Weyerhaeuser forestland to fund their purchase of Williamette Forest Products). These new large land owners may also seek improved reforestation performance and are not bound to use seedlings from their former integrated bareroot nurseries.

Conclusion

As the US progresses towards more advanced silvicultural methods, there are opportunities for Canadians willing and able to offer their service or expertise in this country, particularly in the areas of container nurseries and tree planting services.

However, the differences between Canada and America are considerable, and in order for Canadian firms to achieve success in the silviculture industry in the US, it may not be good enough to simply ship Canadian products or workers across the border. In order to achieve success in the US market, one has to be physically located in the US. 🌲

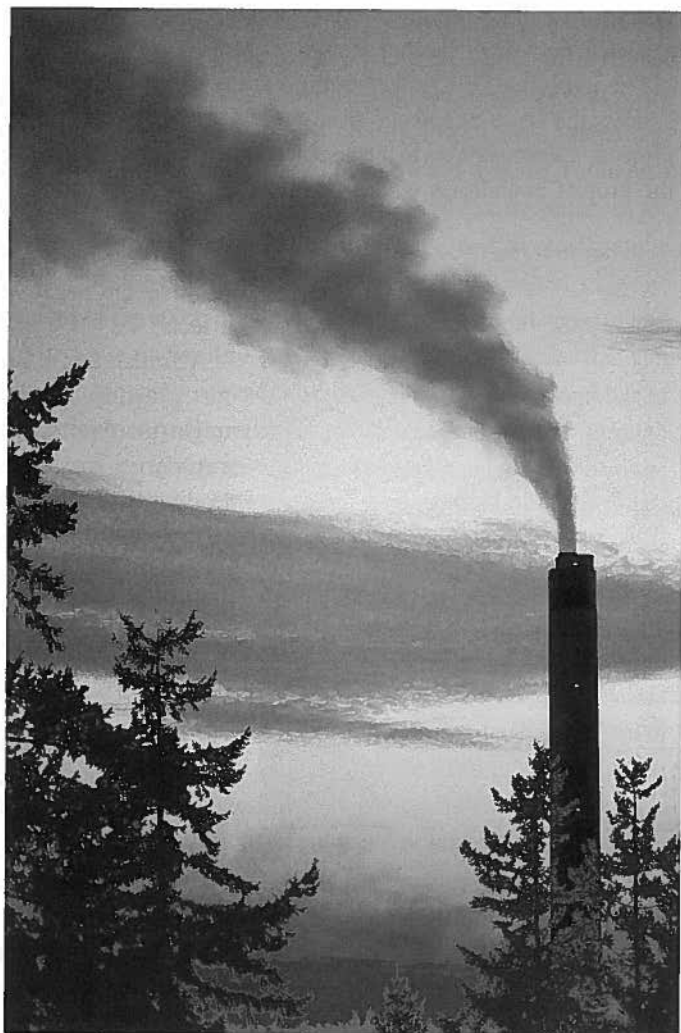
Arne Aiking worked with nurseries in every province of Canada from 1985 to 1994 assisting in the conversion from bareroot systems to automated containerized technologies. In 1998, Arne founded American Tree Seedling in the US which now has capacity to produce 30 million containerized seedlings per year. Arne can be reached at aaiking@americantreeseedling.com

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Carbon & Credits Afforestation

by Thomas White and Werner Kurz



The Canadian Government has decided to ratify the Kyoto Protocol (KP). The protocol, and its parent treaty, the United Nations Framework Convention on Climate Change (UNFCCC), seek to reduce the rate of carbon-dioxide (CO₂) accumulation in the global atmosphere by encouraging signatory countries to decrease their greenhouse gas (GHG) emissions from fossil fuel use and increase their net uptake of carbon (C) from the atmosphere in terrestrial systems (e.g., forests and agricultural lands).

The KP sets country-specific targets for GHG emissions reductions relative to 1990, without specifying how the target must be reached. The KP recognizes the establishment of new forests on areas that have not recently or ever contained forests as one means by which countries can reduce their net emissions of GHGs. By taking up C from the atmosphere and storing it in woody biomass, the net effect on the atmosphere is, at least for the lifetime of the trees, similar to reducing C emissions. In its climate change plan for Canada, the Government of Canada (GoC) has proposed, amongst other measures, a Domestic Emissions Trading (DET) system that would establish reduction targets for large industrial emitters, facilitate emissions trading amongst parties covered by the system, and enable emitters to purchase offsets generated by forestry and agriculture activities that sequester C.

The Kyoto Protocol and the recent Marrakesh Accords are specific about how C in forests must be accounted for, and how C credits are defined. Whether any, all, or a portion of these credits can be sold as offsets in a DET is the subject of ongoing consultations between the GoC, provinces and territories, industry and other stakeholders. This article presents the basic rules of

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the KP as it relates to newly established plantations and outlines some of the general areas of policy concern surrounding domestic trade in C credits.

How are C credits calculated?

The formal definitions of afforestation and reforestation applicable to the KP were finalized at the 7th Conference of Parties to the UNFCCC in Marrakesh, Morocco, in 2001. Countries are required to report the C stock change during the first five-year commitment period (CP), January 1st 2008 to December 31st 2012, on areas affected by land-use change – afforestation, reforestation, deforestation – since 1990. Countries receive credits or debits depending on whether the C stocks on affected lands have increased (a C sink) or decreased (a C source).

Under article 3.3 of the KP, a new plantation is eligible for credit if it originated through human activity since 1990, on land that was not forested, or not in a forest use, before 1990. A plantation is termed afforestation or reforestation according to historical land use, but the reporting requirements are the same. Because of the requirement for a non-forest land use prior to 1990, reforestation, as defined by the KP, is not the same as regeneration following harvest.

Each instance of afforestation/reforestation would result in a positive credit to the national account based on the total C sequestered by that activity during the CP. The credit is based on the annual net change in each of several ecosystem C pools: above-ground biomass (tree stems, branches, foliage), below-ground biomass (roots), litter, dead wood, and soil organic carbon. The mere presence of C stocks in the pools during a CP does not result in a credit. Carbon that has accumulated before the beginning of the CP won't be credited, even if it results from an eligible activity that has occurred since 1990. Conversely, however, C losses prior to the CP are not debited either.

The KP allows countries some flexibility in determining the minimum size of the land units they wish to include in their accounts (0.05-1ha). Given the size of Canada, it is unlikely that areas smaller than 1 ha will be included in the accounting system since it would be impractical and not cost-effective to monitor smaller areas. Thus it is likely that only new forests larger than 1 ha would be eligible for credit as afforestation or reforestation.

Which credits can be sold?

In its Climate Change Plan for Canada, the government has indicated its desire to allow the sale of credits generated by new investments in forest sinks as offsets in a DET. Current plans are to use credits resulting from business as usual activities to meet national emissions reductions targets. Restricting the sale of credits to those generated by new incremental activities ensures that these credits have an appropriate value relative to efforts to reduce C emissions in other sectors of the economy.

The evolving DET/offset trading framework will need to address the issue of leakage from incremental C sequestration projects. Leakage refers to the displacement of an activity outside the project boundaries where its effects may not be properly accounted for. Leakage can have positive and negative effects.

Afforestation with fast growing species might increase wood supply in an area, leading to a decrease in harvesting elsewhere in the region, with a resulting additional increase in C storage outside the project boundaries. On the other hand, if planting trees results in the displacement of an agricultural activity,

and causes deforestation outside the project boundaries, the deforestation would result in a C loss. The issue of negative leakage is of national concern. In the latter example, while a private entity might benefit from the sale of C credits from tree planting, the public could be liable for the debit resulting from the deforestation. The DET framework will need to include appropriate policy measures that accurately scope incremental C sequestration projects to minimize and account for the negative effects of leakage.

Hosts of incremental C sequestration projects will need a measurement and monitoring system that enables them, and independent third party auditors, to validate the credit for the benefit of investors, regulatory authorities and interested observers. The Canadian Forest Service has been working on C accounting issues for more than a decade, and has developed the Carbon Budget Model for the Canadian Forest Sector (CBM-CFS2) that facilitates estimation of the C sequestered in forests, including C in the non-merchantable portions of trees, forest floor litter and woody debris, and in the soil. Through its work with the Model Forest Network and other partners, the CFS Carbon Accounting Team is designing tools and protocols for

Expense Table Example:
You would pay the following expenses, including the maximum sales charge, on a \$1,000 investment in a fund assuming (1) a 5% annual return and (2) full redemption at the end of each time period:

	1 Year	3 Years	5 Years	10 Years
\$	70	\$ 118		
65		103		
63		97	\$ 169	
73		125	142	\$ 306
63		95	132	265
65		101	180	233
62		93	129	329
58			139	225
59			126	246
		81		219
		85	106	
		66	112	176
		45	79	189
			67	119
				130

operational scale C accounting that will be compliant with expected regulatory requirements. These tools could form a component of a cost-effective and proven monitoring system that specifically addresses C sequestration from newly established plantations.

Permanence and Risk

Unlike avoided emissions, which are forever prevented from entering the atmosphere, a unit of C sequestered in a plantation lacks permanence, existing only while the trees are alive and growing or the C is stored in dead organic matter on site. Any disturbance to the plantation – flooding, insects, fire, harvesting, etc.- resulting in a reduction of ecosystem C on site would also emit C to the atmosphere. This has important consequences for C credit trading. The buyers or sellers of C credits must assume liability in case of C losses during a commitment period, up to the amount of the credit previously claimed.

The issue of liability will be greatest for small entities that cannot adequately spread the risk of C loss across a number of plantations. Small producers could mitigate this risk through cooperative arrangements to jointly market credits based on the C sequestered annually in participating plantations. Larger entities could limit their exposure by regionally diversifying their plantation investments.

The lack of permanence may not be disadvantageous for the market positioning of C credits derived from plantations. John Bennet and Dave Mitchell of the Saskatchewan Soil Conservation Association, and Roger Sedjo, Gregg Marland and Kristy Fruit in a paper published by Resources for the Future, a Washington think tank, have suggested that renting rather than selling C credits from plantations would allow buyers and sellers to overcome the permanence issue in a mutually beneficial fashion.

C credits would be calculated based on the amount of C sequestered annually throughout the rental period, with the seller assuming the liability associated with any loss of the credit. At the end of the rental period, liability reverts to the buyer, who

could opt to renew the rental contract, purchase credits elsewhere, or who may by this time have achieved substantial energy efficiencies in their business processes and no longer require C credits.

Although the income from the rental of C storage would be lower than from the sale of the credit, there is less risk to the plantation owner, who does not assume liability for the C storage beyond the rental period. In this approach, lower cost temporary credits could be attractive to buyers who expect to meet their emissions reduction targets over a medium time frame, but need to purchase credits to meet short-term targets.

Plantation developers need to be aware of the KP rules regarding afforestation and reforestation if they wish to scope their activities to generate C credits. They also need to be aware of the unresolved policy implications of trade in C credits from forest sinks. Until a framework governing the sale of C credits within the proposed DET has been finalized, new plantation owners will need to exercise prudence in evaluating the opportunity to sell C credits. Clarifying these issues early to encourage the establishment of new forests will increase the potential benefits from C uptake during the first CP, as C uptake in new forests increases with time.

Readers interested in a project level perspective are referred to an article by Lemprière et al. appearing in the Nov/Dec 2002 issue of the Forestry Chronicle, titled *Saskatchewan Forest Carbon Sequestration Project*. The article describes a forest-based C sequestration project in Saskatchewan that was part of the Greenhouse Gas Emissions Reduction Trading (GERT) pilot. More information about C accounting can be found at the CFS- Carbon Accounting Team's web site online at <http://carbon.cfs.nrcan.gc.ca>.

The authors would like to acknowledge Tony Lemprière and Darcie Booth for comments they provided on a draft of this article. Werner Kurz and Thomas White work at the Pacific Forestry Centre with the Canadian Forest Service. Thomas White can be reached at T 250-363-3742, F 250-363-0775 or thwhite@nrcan.gc.ca

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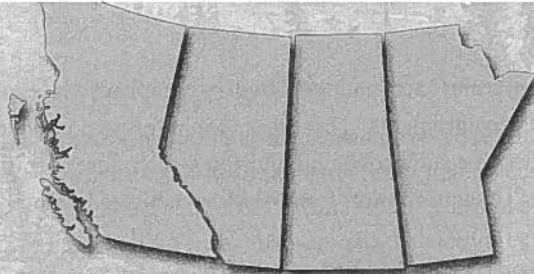


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Western Silvicultural Contractors' Association



by John Betts, Executive Director WSCA

Backsliding on the BC Backlog?

The new amendments to the Forest Practices Code of British Columbia that came into effect in December appear weak on dealing with the province's backlog - both the old not sufficiently restocked (NSR) and any new variations that might emerge in the future. The term backlog doesn't warrant a definition in the amended Code. Missing as well are two former provisions that effectively compelled the Crown to remedy areas destroyed by wildfire, pest and disease. Government is now not legally bound to deal with the latter and can do, in its wisdom, what it sees as fit. As for the former old backlog obligations, these are now described as discretionary silviculture eligible for funding under the Forest Investment Account (FIA).

All this suggests that government is getting out of the backlog business relying partly on an administrative remedy (making the backlog not exist for the Crown) and on offloading responsibility onto the FIA account. Unfortunately, FIA

may be driven primarily by stakeholders likely to be more preoccupied with their immediate business interests than dealing with long-term considerations such as backlog reforestation. Even if the un-

The real challenge now lies in the emerging backlog of impeded stands; backlog stands that are satisfactorily restocked but not yet free growing.

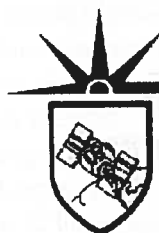
addressed backlog threatens the cut and motivates licensees, FIA is hardly reliable funding. It is under-funded and oversubscribed and up for annual renewal

by a government determined to rein in public spending.

Besides the deletion of old Code provisions for dealing with general areas destroyed by catastrophe, the Crown's apparent retreat from the direct public stewardship of provincial forests appears again in a new amendment provision relieving licensees of free to grow obligations in some situations where plantations are lost to wildfire or other damage.

This is reasonable and the government will fund the extra expense. However, there is a caveat that allows the Crown to waive the obligation. In other words, at its own discretion do, perhaps, nothing.

In these cases of catastrophic damage, which are common these days, we are left wondering what criteria or principles will guide government's discretion. The future results-based Forest Range and Practices Act regulations should not remain silent on this point. It should clearly list the results expected of the Crown in these cases.



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As of February 2001, the Ministry of Forests estimated there were 55,421 hectares of treatable pre-1982 backlog NSR and 40,548 hectares of treatable 1982-87 backlog NSR on Crown Land in British Columbia.

Notwithstanding the contention held by some that these are conservative estimates, the old backlog may not be a huge area; equal to roughly half the hectares planted annually in B.C. Still our progress is lagging badly, with less than 9000 hectares treated annually and the former 1996 FRBC \$250-million 10-year backlog reforestation commitment long gone.

But the real challenge now lies in the emerging backlog of impeded stands; backlog stands that are satisfactorily restocked but not yet free growing. In the Ministry of Forests 2001 Summary of Backlog NSR and Impeded Forest Land approximately 2.4 million hectares are classified as impeded. This is likely an exaggeration since the estimate may include some stands that are growing with their status not yet properly declared.

With the accuracy and number of surveys expected to increase, the impeded estimate may decrease. Nevertheless, impeded stands represent a potential large long-term backlog commitment if we are to keep our forests productive.

Along with the impeded stands issue, more than 3-million hectares of forestland in the province are under threat from insects

and disease. As this catastrophe, which is not limited to the Interior mountain pine beetle, continues to race ahead of us clearly backlog is in the making.

Add to this litany the looming wildfire threat and the future backlog it represents. On this subject, there is an alarming degree of fatalism among some foresters, protection branch staff, and forest ecologists. Many experts believe a huge wildfire season, and perhaps more than one, similar to the Australian and U.S. experiences, is waiting in the province's woods. A combination of disease, pest, decades of suppression, preservation set-asides, and some forestry and logging practices have all created a radical departure from the historical fire regimes in the forests. Fuel buildups have created a situation where unavoidable circumstances are bound to produce unnaturally intense and extensive forest fires in the future across much of the province.

Government will need all the help it can get in addressing these problems. The backlog, no matter how we define it or don't define it, is likely to be with us for some time. The new Forest and Range Practices Act regulations that will be developed in the near future to replace these interim Code amendments will need to fully recognize that fact. Otherwise we open the door to compromising the future productivity of our forest ecosystems.

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New Brunswick



Independent Silviculturists Association

by Gaston Damecour

In September 2002, this column stated:

- Both the Province and the province's forest industries through the New Brunswick Forest Products Association have undertaken a major review of how forest management is conducted and the objectives that drive it.
- One of the proposed objectives is to double the provincial wood supply by 2050.
- New Brunswick is approaching the bottom of its wood supply curve.

On December 11, 2002, the Province of New Brunswick and the New Brunswick Forest Products Association released the report, *New Brunswick Crown Forests: Assessment of Stewardship and Management*. The report is a summary of a comprehensive analysis of New Brunswick Crown Forests. The analysis was conducted by an internationally recognized forestry consulting firm, Jaakko Pöyry Consulting (JPMC), at the request of the New Brunswick forest industry and the provincial government.

On December 28, 2002, the Jaakko Pöyry Consulting report was issued.

Perhaps the most significant report since the development of the Crown Lands Act during the early 70s, the objectives of this study were to:

- Benchmark policies and practices for stewardship and management of New Brunswick's forests with other regions in North America, Nordic countries and other relevant timber production regions
- Identify the potential for improvement in New Brunswick
- Prepare scenarios for improvement in New Brunswick
- Determine the conditions for success for each scenario (DNRE News Release: JPMC Study, February 2002)

The values presented in this article are quoted from the JPMC report, are arrived at by examining the tables in the report, or are commonly accepted values in New Brunswick.

An assignment such as that undertaken by JPMC suggests the status quo is in question. Clearly, changes are in the making, and given where New Brunswick is on the wood supply curve, the proposed intensive forest management regime will influence the type, level and intensity of silviculture intervention and, significantly, its funding. The JPMC report addresses:

- The continuing erosion (now at 32%) of the current Crown productive land base to meet environmental, ecological and other non-timber values/objectives.
- The fact that timber production is considered only after

environmental, ecological and other non-timber values/objectives are addressed.

- New Brunswick is experiencing the tight wood supply that was forecast and was the basis for the Crown Lands Act (1982) and the province's world class forest data and management system.

The report seeks to put Crown forest management and fibre production objectives on an equal footing with environmental, ecological and other non-timber values/objectives. In effect, it seeks to set long-term land-use guidelines and levels that will protect the productive (fibre) Crown forest land base from further erosion. The concept of security of supply and even enhanced supply can then be used to justify an intensive investment in, and management of the "productive forest".

The following table summarizes wood supply/production in New Brunswick.

Wood Source (million m3)	Softwood	Hardwood	Total		Forest Land Base
Private*	2.1	0.7	2.8	24%	30%
Industrial Freehold	1.9	0.8	2.7	23%	21%
Crown	3.5	1.4	4.9	41%	49%
Import	1.5	minor	1.5	13%	
Total	9.0	2.9	11.9		

* does not include volumes exported

Note that Crown land represents 49% to 50% of the total forest land base; 20% of the forest land base is industrial freehold and 30 - 31% is non-industrial freehold (private woodlots). The Crown's forest land base is critical given the tight wood supply.

The report compares policies and management responsibilities. In terms of intensive forest management and an aggressive investment in silviculture, the report suggests:

- A shift from current natural regeneration rules to planting rules that would capitalize on the extensive provincial plus tree selection for seed sources and tree breeding programs. Planting would increase from 21% of the entire Crown forest land base (incl. protected or special management) to 40% or about 59% of the area harvested (when adjusted for protected or special management areas).
- The planted areas would have to be tended through cleaning and pre-commercial thinning.
- Pre-commercial thinning would decrease in importance from

the current level of 24% of Crown forest area to 18%.

In January 2002 this column reported that:

- The rationalization of the provincial seedling production (for Crown Lands reforestation) involved the closure of two of the three provincial tree nurseries concentrating production at the province's Kingsclear tree nursery.

- In addition to meeting the regeneration requirements, planting is now being considered for the improved genetics of New Brunswick seed orchards. The seed sources, are now in second and third generation, offer 10% to 15% gains in volume.

The proposed levels of intensive silviculture maintain the same levels of special management and protected areas. The area of clear-cutting would remain about the same, with the increases in volume coming from partial cutting or commercial thinning.

The following table was developed through an examination of the Scenario 2 Table on page 47 of the JPMC report. The area harvested, using a partial or "selection cut", would increase from a forecast of about 29% in 2002 of the harvest area to 50% beginning in 2022. The values are approximate.

Harvest Area by Type

	2002	2012	2022	2032	2042	2052	2062	2072
Clear-cut	71%	66%	50%	52%	36%	42%	49%	53%
Partial Harvesting	29%	34%	50%	48%	64%	58%	51%	48%

The cost/investment in silviculture would increase initially from the budgeted \$23-million allocated in 2001 to just over \$50-million a year, then taper to \$34-million a year in the long term [2040 onward]. In the absence of an assured long-term productive

(forest) Crown land base, the source of funding would have to be public.

The Crown softwood supply would increase from 3.5 million m³ (now to 2032) to almost 7 million m³ by 2062, about 100% over current levels.

Granted, the JPMC report is still very fresh; yet, important decisions will have to be made. The effect of such a strategy on the provincial economy is convincing. The effect of the proposed management strategy on the other tenures, particularly the private woodlot sector, has not received the same diligence.

While important decisions on commitment and funding need to be made, the report brings to the forefront the issues of wood supply tenure and wood supply area on public lands. Other jurisdictions will certainly pay close attention as the JPMC report seeks to maintain a balance between the needs of an established forest economic sector and the increasing demands of other non-timber issues.

The forest sector has demonstrated a willingness to accommodate non-timber issues at the expense of wood supply. Now, a new approach to establishing a balance between fiber supply and other issues is needed.

Gaston Damecour is a registered professional forester. He is a senior consultant and principal of AGFOR, a New Brunswick-based forest and management consulting firm. Mr. Damecour has been instrumental in bringing about significant changes in the forest sector by representing both governments and industries on such issues as health and safety, forestry equipment standards, industrial relations, wood allocations and forest management policy. He has assisted communities and businesses in initiating change and/or dealing with various interest groups.



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Prince Edward Island



Forest Improvement Association

by Wanson Hemphill, Manager

The long-awaited Provincial Forest Enhancement Program has begun with a modest budget of \$100,000 as incentives for non-clearcut forest treatments including management plans, pre-commercial thinning, commercial thinning, crop tree release, patch and strip cutting and regeneration cutting. Rates are intended to provide 2/3 of the cost of the treatment with 1/3 coming from the forest owner. Incentive rates are increased for treatment in 50 metre stream management zones and to allow for planning and measuring. The uptake in this fiscal year by private forest land owners remains to be seen given the lateness of the season, weather, poor markets and lack of much program promotion.

Recent forest ownership statistics show 87.1% private ownership of 275, 471 forested hectares with 11.7% owned by non resident owners and 24,040 forested parcels owned by 16,641 owners and 24 government agencies. The average woodlot size is 14.3 hectares and 37.4% is owned by bonafide farmers.

WCB rates are predicted to either increase or stay the same across Canada for 2003. On PEI, an increase of 5.24% will bring the average rate to \$2.41/\$100. Forestry group # 201 will see a

9.3% decrease in rates to \$9.73/100. The decrease is thought to be due to less severe accidents, increased mechanization and promotion of safety.

Irving's Georgetown Timber has stopped processing studwood until the markets improve in January but is still buying wood at the mill @ \$110/cord roadside. Recent heavy and frequent rains make for very soft ground conditions. Most wood producers are working on high ground while waiting for frozen ground to reach some wood.

A recent Green Energy workshop agreed that committing to Kyoto won't stop climate change, but is a move in the right direction. The earth has a history of warming and cooling and increases and decreases in CO2 during 100,000 year cycles. We are now in a 400 year warming cycle whose peak has been increased by increased CO2. Earth has used 1 trillion of the 2 trillion barrels of available oil. Many participants thought that much more could be gained by focusing on reducing emissions and encouraging renewable energy use than through planting more trees as carbon sinks.

Think safety, Wanson Hemphill, fia@pei.sympatico.ca



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Nova Scotia



Silviculture Contractors Association

by Ed Davidson, President

With the usual snow this time of the year, things are slowing to a different pace for the silviculture industry here in Nova Scotia. For many, it's time to finish up late season jobs, begin equipment repairs put off until now and reflect over the past work season.

A fellow contractor perhaps summed up 2002 in a nutshell when he described it as an opportunity for more work but at smaller and smaller margins. No doubt, this goes hand-in-hand with the lingering economic malaise but the provincial system of silviculture "credits" is also at play. In a system where mills earn credit-points for completed treatments, the approach seems to get work done but with some side affects. Those smaller margins are one of the obvious ones but along with that goes less take-home pay for workers and an industry that some tell me is roughly shaping up as a parallel to pumping gas or flipping hamburgers.

Another side affect is that although industrial land is being looked after, the private land portion of our forest resource is not keeping pace. Some mills have also made me to understand they

have given up trying to offer input because their voice is not being heard by the province.

Looking outward, the consensus has a provincial election on the horizon and perhaps with it will come an opportunity for some of these things to be addressed.

On another front, I recently had an interesting conversation with a representative of the Maritime Forest Ranger School. The MFRS is a high profile, well-respected educational institution which has made a reputation by turning out high quality students at the technician level for almost sixty years. (Many of us here in Nova Scotia and elsewhere know full well what I mean.) It was disappointing to hear that the 2002 graduating class was perhaps the smallest ever, and more and more, students are seeing the forest industry as less and less attractive. When I asked for an explanation, I was told that politicians are telling academics that this industry is a "twilight" career. If that's the type of message that is being passed along, then we might reasonably expect to encounter a human resource crunch sometime in the future.

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CSA publishes standard on high-visibility apparel by John Levesque

Silviculture workers and their employers now have a standard to help them judge the safety and effectiveness of their high-visibility safety apparel. The Canadian Standards Association has just published the first edition of Standard CSA-Z96 for garments that are designed to make the wearer more visible in poorly lit or dark work environments or in areas where workers on foot are exposed to the danger of moving vehicles and equipment.

The CSA standard is based on the existing American National Standards Institute (ANSI) guidelines for high-visibility apparel. Like the American standard, the CSA standard offers a choice of three fluorescent colour schemes for high-visibility clothing—yellow-green, orange-red or red. It also contains performance standards for both the retroflective and background material of the apparel.

“The European standard was first, then the American standard was built on that,” said CSA project manager Dave Shanahan. “Our standard is similar to the American one, except that we’ve expanded things a little more. For example, we’ve set out a specific configuration of retroflective trim.”

The CSA standard for retroflective trim is two vertical bars at the front, an X at the back and a stripe around the waist. The purpose of this configuration is to enable other workers to tell from a distance if the worker wearing the apparel is facing them or has his or her back turned.

“The standard is naturally aimed at the natural resources workplaces, because people often work in inclement weather conditions and they need to be as visible as possible,” Shanahan said.

The CSA has established three classes of high-visibility apparel based on the portion of the body that’s covered by retroflective trim:

- Class 3 apparel provides the greatest visibility to the wearer in poor light conditions by including retroflective coverage of the legs as well as the upper torso.
- Class 2 apparel provides retroflective coverage of the upper torso.
- Class 1 apparel is a basic harness consisting of stripes/bands over the shoulder and around the waist.

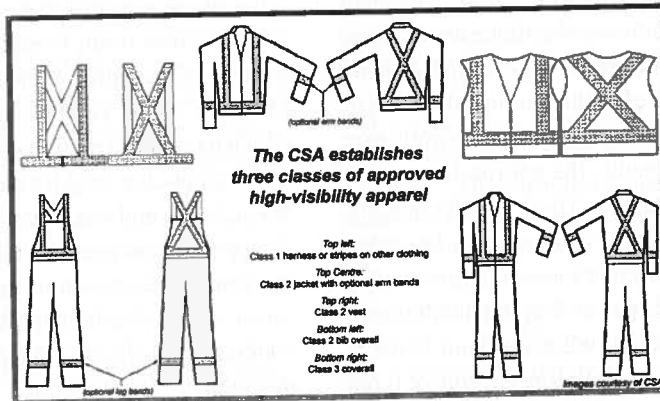
over the shoulder and around the waist.

Specific legal requirements for high-visibility work apparel vary across the country. In Ontario, for example, high-vis requirements are spelled out only in Regulation 145 of the Occupational Health and Safety Act governing construction projects. But silviculture employers and supervisors have general due diligence obligations to ensure that workers are clothed safely,

and workers have a responsibility not to endanger themselves or others.

The CSA standard acknowledges that high-visibility apparel is only a second line of defence and that the first priority should be to control the exposure of workers to moving vehicles through the use of physical barriers and other workplace design features. The standard recommends that a hazard assessment be conducted at each work site to determine the risk to workers of being struck by vehicles or machinery.

The new standard can be ordered from the CSA by calling 1-800-463-6727 or by visiting the CSA Online Store at www.csa.ca. John Levesque is with the Ontario Forestry Safe Workplace Association www.ofswa.on.ca



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Safe Travel on Logging Roads

by John Murray

If you've ever had a chance to fly over a bush area that has been logged, you've been able to see the network of rough roads constructed to move people, machinery and logs. These roads are not meant to be permanent and they are neither built nor maintained to the same standards as thoroughfares constructed primarily for high-speed freight and passenger vehicles.

Workers using private logging roads to access work sites need to understand that these roads were built and paid for by the logging companies, themselves...not the government, which pays for all other roads. They are single-purpose roads designed and built to get heavy equipment into the bush and to get logs out. They're not paved. In some places, they're not even two vehicles wide. Sometimes they go almost straight up...and almost straight down. Corners may seem like right angles. There will be dense clouds of dust when it's dry and hip-deep water and mud when it rains. Moose, deer and bear may stand out in the middle of these roads to get away from the bugs. Driving into an animal that can weigh more than a thousand pounds can be, and has been, fatal.

Logging roads aren't patrolled by the police. And ambulance service, if needed, may be a helicopter instead of a vehicle. A fully-loaded log truck traveling at sixty kilometers an hour is not going to be able to stop on a dime. Truck operators are paid only for the amount of wood they haul out of the bush to the mill. They're highly skilled but their livelihood depends on getting the wood out so it's generally understood that all other vehicles will get out of their way.

Impress your crew with the fact that logging roads are not paved. Driving on gravel, rocks and dirt and through water, mud and snow is a whole different experience than driving down any highway. Tire grip is almost always marginal. Corners may not be banked. Riding the brakes is certain to blow out one or more tires. Driving through water and mud will mean having no brakes for a while. Sometimes you will encounter a large log on the road that's fallen from a load. Ice and snow (you know it can happen) add an unexpected winter driving dimension. So do fallen trees, dense clouds of dust, fog, rain and squashed bugs on a windshield.

Driving company vehicles on logging roads

Most employers have strict policies about who may drive company vehicles especially special-purpose machines such as buses, tanker trucks and personnel carriers. Special training may be required to operate company vehicles as required by law and insurance companies. Do not operate any vehicle unless you are trained, qualified and competent to do so.

continued on page 24

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General precautions for driving on dirt or gravel roads

Traction for both steering and braking may be considerably less than on asphalt pavement; it requires reduced speed and heightened attention. Obstacles such as washouts, logs and rocks which weren't there on the way out may appear on the way back. Select a lower gear to control the vehicle; riding the brakes causes excessive wear and may result in brake or tire failure. Heavy dust may reduce visibility especially during sunrise and sunset; slow down, use lights to warn other drivers; pull safely off the road and wait for the dust to settle. Your lights should be on at all times and use additional warning lights (four-way flashers) if required. If another vehicle is gaining on you from behind, find a safe place to pull off to be passed and signal your intention to do so. And don't pass another vehicle unless it's absolutely necessary; dust, swirling snow and flying stones may endanger the driver.

When following another vehicle, stay well behind to avoid dust and flying stones. When lost, stop, park safely and stay with your vehicle; use the radio or flag down another passing vehicle to ask for directions or assistance. If you have to jack up a vehicle, make sure it's on solid ground with the wheels chocked with stones or other obstacles before jacking. Washboard road conditions may make a vehicle unstable and cause loss of control; drive slowly since heavy trucks may create deep ruts; wheels on light vehicles such as pickup trucks may not fit in these ruts and cause a loss of control. Clean windshields will soon become dirty or mud-covered; stop safely and clean windows as often as necessary.

In some conditions (cresting a steep hill, driving around a sharp bend, etc.) sound your horn before proceeding to warn other drivers, pedestrians and large animals of your approach. Always wear sunglasses especially when driving into early morning or late afternoon sun.

Check your brakes after driving through water; apply light pressure to dry them, if necessary. Check the ground under a vehicle before driving; loss of engine oil or brake fluid could have serious consequences. Be extra careful driving in the bush when conditions increase the probability for forest fire. You could become trapped in a fire zone.

Winter conditions on bush roads

In the dead of winter, at higher elevations or even in late spring or early fall, it's not unusual to encounter winter driving conditions on backcountry roads. Vehicles should be equipped with snow tires, chains or both. Drive for conditions; drive more slowly; leave more space between vehicles. Warm vehicles and clear all windows of snow, ice or frost before driving and use winter-grade windshield washer fluid and winter-type windshield wiper blades. Avoid driving through puddles in freezing conditions; brakes may freeze. Parking brakes may freeze in sub-zero conditions if left on for extended periods or applied when wet. Keep lights, especially warning and emergency lights, clean at all times.

Always carry emergency equipment such as shovels, tow straps, jumper cables for your own as well as other vehicles in need. Carry extra clothing, food and water in case you become lost or stranded. Test your radio equipment before starting a trip and check in often along the route. Veteran winter drivers add gas line anti-freeze to every fill-up and know how to shift a four-wheel-drive system if the vehicle is so equipped. Unloaded or lightly-loaded trucks may not have much traction at the rear wheels. Practice braking and skid-control maneuvers in a safe location.

John Murray is with the Ontario Forestry Safe Workplace Association

Company Vehicles

Company vehicle policies should cover the following details:

- designated operator qualifications
- items to be checked during a technical safety walk-around inspection of a vehicle by the operator before using it; filling out a checklist and signing it may be required
- fuel and safe storage of spare fuel
- condition of tires and the spare tire
- on-board tools and safe tool storage
- on-board first-aid equipment and safe storage
- on-board fire-fighting equipment, safe storage, how to use it
- communication procedures (usually two-way radio)
- rules for passengers
- procedures to follow in case of a mechanical breakdown, accident, fire, getting lost
- personal protective equipment required for operators and passengers
- procedures for safe loading of trucks and trailers
- maximum allowed speed for bush road travel
- special or unique rules of the road
- safety procedures to follow during encounters with logging trucks and other working vehicles
- use of emergency flashers or strobe lights
- penalties for driving under the influence of alcohol or drugs

Blister Rust

Forest Health

by Lynda Chambers

Can solid deer protectors prevent blister rust from attacking white pines? Plastic tubes placed over young white pine seedlings to discourage nibbling by wildlife may be protecting new growth from far more than ravenous deer and elk. A study by Dr. Richard Hunt (rhunt@pfc.cfs.nrcan.gc.ca) of the Pacific Forestry Centre indicates that the physical barriers also reduce the incidence of a disease called white pine blister rust caused by the fungus *Cronartium ribicola*.

Cronartium ribicola was introduced to eastern and western North America on infected white pine seedlings sometime prior to 1915. It has caused so much damage and death since then that, in many areas, pine has been all but abandoned as a commercial tree species. Trees are killed or severely damaged as the fungus grows into and down the branches toward the trunk, eventually producing blisters that break through the bark and make it easier for other fungi and attacking insects to invade the tree further.

It appears that the deer protectors are either preventing spores from reaching the lower branches of the seedlings where most cankers start, or they are creating a micro-climate inside the barriers that inhibits blister rust infection. Whatever the reason, the Canadian Forest Service study has found that the incidence of blister rust drops by as much as 90 per cent in seedlings encircled by plastic.

"Our studies suggest that once the seedlings reach the 1.2 metre height of the protectors the tubes can be removed, after the autumn release of spores, and the young trees will continue to grow in relative safety for another two years before pruning is necessary," says Dr. Hunt. Pruning has been proven to save susceptible young trees from blister rust by removing small, new cankers confined to branches at the bottom of a tree before they grow into the stem. By reducing the initial incidence of blister rust, the protectors make it possible for more seedlings per stand to survive to a size where they can be successfully pruned.

Dr. Hunt's study began in 1996 with the planting of 500 seedlings at four British Columbia sites: a coastal location called Gordon; an interior location called Beaton; and two other coastal sites, Pender and Trout. The tallest solid barriers available were selected for this study because 85% of blister rust cankers are found within 1.5 metres of the ground. The two types used were a tall, cylindrical deer protector, and a cone-shaped mini-greenhouse. Barriers were inspected at least annually.

"When in the lab, the concept of using deer protectors was very exciting because it was a unique method of preventing disease; but in the real world it appeared cursed by mother nature – cold, wind, snow, rocks, weeds, elk and bears all proved very frustrating," recalls Dr. Hunt.



By 2000, most of the seedlings were taller than 1.2 metres and it was time for the final blister rust tally. At the interior Beaton site, there was a notable reduction in rust incidence. Only 3% of the seedlings with barriers were infected as opposed to 31% without barriers. At the two coastal sites of Pender and Trout, twice as many seedlings without protectors had cankers. The reduction in rust incidence at the Beaton site along with the pooled reduction at the Pender and Trout sites suggests that barriers can reduce blister rust incidence on white pines and certainly do not increase its incidence.

In conjunction with the BC Ministry of Forests, new research is testing more rigid types of barriers. Already fewer barriers are being damaged by snow. Dr. Hunt notes, "The new barriers are more wind-firm because of better staking systems and in the new trials, sites favouring bears and elk have been avoided." The new barriers also have a greenhouse effect, which should give the pines a growing advantage over unestablished weeds.

Lynda Chambers is with the Pacific Forestry Centre and can be reached at lychambe@PFC.Forestry.ca

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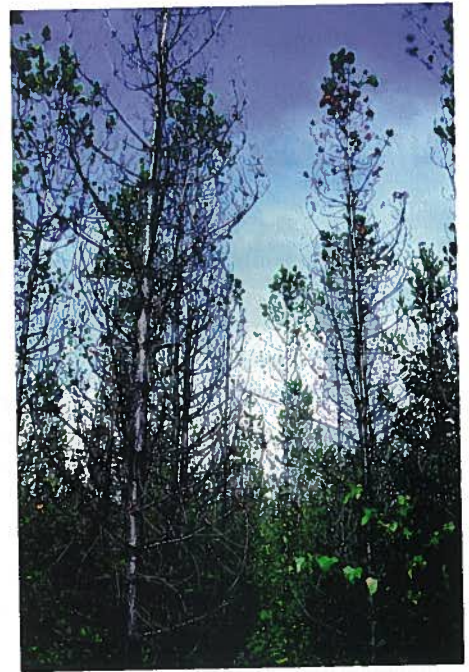
Dothistroma

Something is happening to lodgepole pine plantations in the Nass-Skeena transition area of northwest British Columbia. The majority of the trees in these plantations are losing their needles at an alarming rate. Many trees have less than half of the needles they should have for their age. In the most severe cases, entire plantations are dying. The severity of needle loss has even caused the death of a few mature stands of lodgepole pine. The trees are not giving up easily. Many juvenile lodgepole pine trees are sprouting adventitious buds from the bole and even the root collar, after all of their original needles have been shed. This is not normal behavior for lodgepole pine. The most heavily impacted stands are a sobering sight for any forester.

The culprit is *Dothistroma* needle blight, caused by the fungus *Mycosphaerella pini*, a foliar disease of pines in temperate forests throughout the world. *Dothistroma* infects needles and kills them, causing them to be shed prematurely. Heavily infested trees have only the needles associated with the

current year's growth. With repeated heavy attacks, the current needle complement diminishes each year due to the inability of the trees to produce adequate photosynthates. Eventually, after four to five years, the trees succumb.

Dothistroma spreads by spores released from dead pine needles that were attacked the previous year. The spores are transported in tiny water droplets either through rain-splash or in clouds and fog. *Dothistroma* spores are released throughout the year any time the dead infected needles are sufficiently wet and the temperature is between 5 and 25°C. *Dothistroma* spores can infect pine needles whenever the needle surface is wet. The first symptoms of infection are dark green bands, resembling oil stains, and yellow and tan spots on otherwise healthy needles. Later these bands turn a deep red-brown and the portion of the needle beyond the band is killed and turns red. The sharp delineation between green needle tissue and red, dead tissue, with a brighter red band at the interface, is the most characteristic feature of this disease.



Dothistroma needle blight is often referred to as “red band” needle disease because of this symptom.

The *Dothistroma* needle blight outbreak in northwest BC is the largest and most severe outbreak to date in this province. *Dothistroma* needle blight has previously been known to cause severe damage, primarily in plantations of exotic species. What has changed so significantly in this environment that a foliar disease can kill even mature native lodgepole trees?

Part of the answer lies in the weather. The infection process for *Dothistroma* needle blight illustrates the importance of climate in the spread of this disease. The climate of the northwest has a strong coastal influence and is generally wet and cool during the growing season. The fungal spores require wet conditions during the growing season, both to be released and to germinate and infect new hosts. Climate change forecasters have predicted that areas such as the northwest of BC will have even cooler, wetter summers. It is not yet clear that the weather of this area has changed significantly. There has been a slight trend towards greater rainfall during the period of May-August since the early 1990's.





Perhaps a change in the weather has influenced the *Dothistroma* epidemic.

What has changed significantly in this environment, is the extent of young lodgepole pine stands on the landscape. In the Kispiox Timber Supply Area (TSA), for example, managed stands are dominated by lodgepole pine and interior spruce. Historically, these species each comprised only about 10% of the forest. It is possible that *Dothistroma* needle blight has always played a role in limiting the extent of lodgepole pine on this landscape. The recent abundance of young, susceptible, lodgepole pine plantations has provided an opportunity for *Dothistroma* needle

blight to flourish. The high concentration of a susceptible host species, in combination with a climate quite suitable for this disease, is the most probable explanation for the current epidemic.

Currently, plans to fill-plant under the worst of the dying lodgepole pine plantations are being developed. The fill-planting program in the Kispiox TSA for next year will cover approximately five hundred hectares. If the disease continues to spread and intensify as it has over the past 5-6 years, the scale of this fill-planting program could become vast. There are over 25,000 ha of lodgepole pine-leading plantations in northwest BC.

There is a long-term remedy for this disease. If we reduce the amount of host in the environment, eventually the disease could return to more stable levels. The northwest has a rich variety of native tree species, such as western hemlock, western redcedar, true firs and interior spruce, which are not susceptible to *Dothistroma*. The full suite of tree species should be managed for in the future, and the amount of lodgepole pine prescribed for future reforestation must be greatly restricted. The diversity of the natural forests must be maintained in managed stands, in order to ensure that these forests are resilient enough to withstand the next wave of pests or disease like *Dothistroma*.

Alex Woods, MSc. RPF is a Regional Forest Pathologist with the Prince Rupert Forest Region, BC Ministry of Forests. He can be reached at Alex.Woods@gems8.gov.bc.ca

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BC Revamps Forest Regime

by Janice Walton

Recently, the Government of BC took the first steps in moving to a new regime for the practice of forestry, when it passed the *Forest and Range Practices Act* (FRPA). The FRPA, expected to be effective in the spring of 2003, will replace the current *Forest Practices Code* (the "Code") with a system that enables the government to set results to be achieved on the landbase, while leaving the 'how to' of reaching those results up to the licencees. The FRPA requires the government to set clear objectives, through regulation, for the key forest values, including soils, timber, fish, biodiversity, cultural heritage resources, visual quality, water, wildlife and resource features. Licencees are required to produce, and have approved by the Ministry of Forests, a forest stewardship plan, which sets out strategies for achieving the objectives set under the regulations. Although the FRPA has

been passed, the regulations are still under development. Silviculture prescriptions, road layout and design, and deactivation prescriptions will not be required under the FRPA, although licencees are required to prepare site plans and have them available upon request. Part of the vision of implementing a workable "results-based" regime include tougher penalties for non-compliance, and to that end, the Ministry has indicated that the bulk of its resources will be directed to compliance and enforcement.

A significant new development under the FRPA is the transferability of silviculture liability, and the assumption of liability by the government for plantation failures. The FRPA contains a provision which allows for persons to be granted relief from the obligation to establish a free growing stand in the

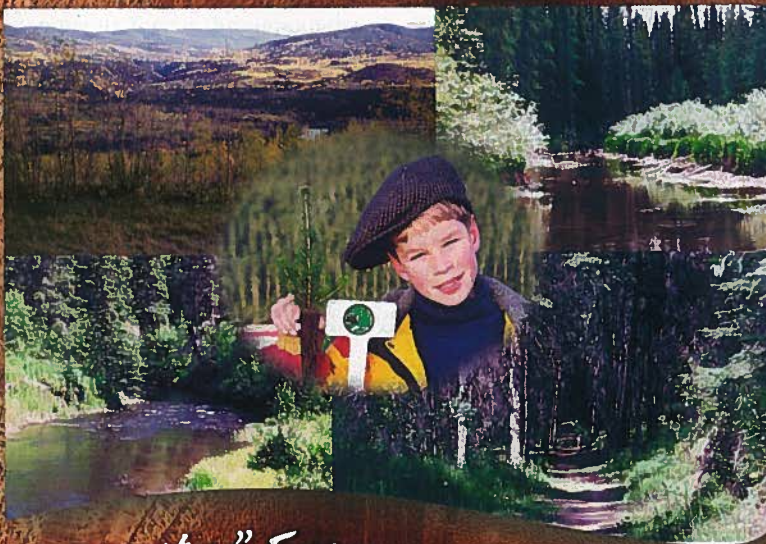
event that damage occurs which results in an inability to meet the obligation to establish the stand without significant extra expenditure. This relief from liability is contingent upon the person not having caused or contributed to the damage, unless due to an officially induced error, or having exercised due diligence in relation to the cause of the damage. Alternatively, the district manager may provide funding to restore the stand to the stage it had reached when the damage occurred. In addition, the FRPA provides a mechanism by which a licensee may make a declaration that specified obligations have been met, and if there is no objection taken to the declaration by the District Manager, the obligation will be deemed to have been met.

Although the FRPA is expected to be in force in the spring, its full implementation will take two years, and in that period, licencees will have the option of continuing to operate under the Code, or switching to the new regime. Meanwhile, the Code has also been amended in order to lighten the regulatory load for licencees currently working under approved Forest Development Plans.

One of the cornerstones of this results-based regime is an increased reliance upon the professional skills and judgement of licensed foresters, agrologists and biologists and along with the introduction of the FRPA, the Government also introduced three pieces of legislation related to the increased



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accountability for professionals working in the forest industry in BC. First, the *College of Applied Biology Act* was introduced and passed by the legislature in November. It establishes a College of Applied Biology to oversee the profession and provide for accreditation and, according to the Ministry of Forests, is the first of its kind in Canada. The College will set a code of ethics, establish education programmes and assess its member's performance through audits and practice reviews. This approach is similar to the self-regulation model used for many professionals throughout Canada.

Next, the government introduced the *Agrologists Act* and the *Foresters Act* late in the legislative session. Because of the lateness of this introduction, neither of these Acts were actually passed, although a Ministry of Forests source has indicated that the Government intends to re-introduce this legislation as soon as the session resumes in February 2003. Both the *Agrologists Act* and the *Foresters Act* repeal and replace their predecessor Acts.

The *Foresters Act* enhances the capacity of the Association of British Columbia Forest Professionals to govern professional forestry, by strengthening the Association's disciplinary and alternative dispute resolution mechanisms and bringing forest technologists and professional foresters under the governance of a single association. The Act also adds a whistle-blower clause, which makes it an offence for an employer to take action against any forester who exercises professional independence.

Similarly, the *Agrologists Act*, continues to enable the British Columbia Institute of Agrologists to oversee the profession of agrology, and, according to the B.C. Ministry of Agriculture, Food and Fisheries: "updates and improves the professional self-governance system for Agrologists". According to the Institute, Agrology is defined as the application of science to the production and utilisation of plants and animals; the science of agriculture and associated natural resources. This will be the first revision to the *Agrologists Act* since 1947. ♦

For more information, please contact Janice Walton of Blake, Cassels & Graydon LLP, 604.631.3354/janice.walton@blakes.com

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