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Fall 2011

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Restoring Critical Ecosystems

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www.silviculturemagazine.com

Subscription rates: 4 issues per year -
Individuals $20 & HST, Educational institutions $100 & HST
Group rates available, see website for details.

‘What’ is ‘Not Satisfactorily Restocked’ in BC’s Forests?

By Ben Parfitt

In recent months, the dispute over just how well or how poorly British Columbia's forests are re-stocked has taken on a more public profile as senior BC Forest Service personnel past and present offer up widely different accounts.

At one end of the spectrum is a published account by BC's chief forester Jim Snetsinger, in which one of the senior most civil servants in the Forest Service claims that the current extent of "not satisfactorily-restocked" forestland is in the vicinity of 715,000 hectares of land. Snetsinger further claims that there is "potential" for this figure to increase by a further 775,000 hectares due to the mountain pine beetle outbreak, but that only a tiny portion of such lands would likely be replanted due to their remoteness, steep slopes and low productivity.

On the other end of the spectrum sits former Forest Service employee, Anthony Britneff, a recent retiree and professional forester who spent nearly 40 years in the government's employ.

Britneff claims the total extent of NSR is 9.1 million hectares, of which 2.3 million hectares would be reasonable to target for immediate reforestation efforts.

The gulf between the two positions is considerable, and it goes a long way to explaining why BC's independent forest watchdog, the Forest Practices Board, decided in September to launch a special investigation to clarify the status of such lands.

No matter what position the Board sides with, or whether it takes the road most traveled and lands somewhere in the middle, the bigger question is what will ultimately be done after it releases its findings.

That's because much more is at stake than just an independently arbitrated resolution to a dispute between professionals over numbers. At its core, the dispute strikes at the heart of what public officials acting on the public's behalf view as the scope of their responsibilities. If there is a reforestation challenge at hand, is that challenge most properly limited to dealing with only those lands that actively contribute to the so-called "timber harvesting land base", in other words that area of forestland earmarked for likely logging and replanting efforts? Or is the challenge at hand more broad, encompassing all Crown forestland that may be subject to disturbances ranging from historic logging, to overgrazing, to pest and disease outbreaks and wildfires?

Obviously the amount of forestland deemed not-satisfactorily restocked or NSR will be considerably less if the former rather than the latter is the case. This will translate into fewer seed cones needing to be collected, fewer seeds sown in nurseries and fewer seedlings planted.

If it is the latter, then a much different and quite likely far larger restoration effort will be required – one that carries significantly higher costs for the public service acting on the public's behalf, but one that may also deliver benefits that few of us pause to think about.

For example, in the spring of 2007 the lower Fraser Valley narrowly avoided what could have been a one-in-100-year flood, a flood that could have affected tens of thousands of homeowners and damaged some of the best farmland and largest farming operations in the province. A much-feared extended period of warm weather did not materialize and the flood was averted. But had it occurred, a contributing factor to the downstream devastation would have been a preponderance of dead pine trees whose roots no longer absorbed water and whose needles were no longer there to shade the ground.

It would have mattered not one iota to Fraser Valley residents whether the trees in question were on the timber harvesting land base or not.

One other important issue that the Board may wish to consider in "clarifying the status" of NSR lands, is the important question of what the status is of logged forests that have been replanted and deemed to have reached a healthy "free-growing" state. This is an issue that applies much more to the timber harvesting land base at present, but is one that all who care about the economic and environmental benefits of forests ought to care about.

When a logged forest is replanted a milestone is eventually reached where the planted trees are determined to be sufficient in number, density and height to have become free-growing. At this point it is assumed by the Forest Service that such sites will simply chug along to provide merchantable volumes of timber to the forest industry in future years.

But as the Forest Practices Board is aware, new work led by the Forest Service's Alex Woods has unearthed disturbing evidence of declines in the number of living, healthy trees on numerous "free-growing" sites years after the milestone was reached.

Such work suggests that the time has come for a much broader view of what constitutes healthy and sufficiently restocked forests, further underscoring the timeliness of the Board's decision to address this important public policy issue.

Ben Parfitt is a Victoria resident and writes frequently on forestry and natural resource management issues.

Restoring Critical Ecosystems and their Essential Functions

By Steven Apfelbaum

Prescribed burning is a staple in the toolbox of ecological restoration practitioners. Native plants are adapted to fire which was a natural phenomenon in pre-settlement times, whereas introduced exotic weeds are not. When conditions are right, clever burn professionals can create a "fire devil", the incendiary equivalent of dust devils.
Photo by Matt Kocourek

The restoration of critical ecosystems is no longer a nicety. It's a necessity. Why?

Foresters, farmers, and virtually the entire supply chain for many commodity products are experiencing increasing costs and often supply limitations. Those who supply the world's consumers are aggressively searching globally for supplies, from fiber to fuel and even water; the long-standing models, including geographic operations, are now changing.

Behind many of these challenges is a range of issues having to do with conventional growing and harvesting processes, yields they produce, and changes in the availability of soil moisture, fertilizers, and soil nutrients – all of which are important in supporting reliable supplies and affordable prices, at least with existing business and production models.

Because of a number of stressors, big changes are looming that can only be addressed by enhancement and restoration of critical ecosystems. These include:

- Declining soil carbon and increasing greenhouse gases.
- Increasing severity of storms with resulting stormwater runoff and associated erosion and flooding.
- Increasing frequency and severity of droughts with associated change in fire disturbance regimes in many biomes.
- Decreasing groundwater and increasing costs for irrigation.
- Increasing disease and parasite pests.

What is a critical ecosystem?

What is regarded as a critical ecosystem may vary depending upon ones perception of the associated problems. In the U.S., a critical ecosystem has primarily been in the vernacular of the legal and regulatory community. There, it has been narrowly defined as the habitat or ecosystem documented to be essential to any lifecycle of a threatened or endangered plant or animal species.

What we now realize is that the concept of critical ecosystem has more far-reaching implications than previously thought and ecological restoration needs to be much more broadly applied.

An example of soil carbon

The depletion of soil carbon results in significantly increased stormwater runoff. Arguably, any soil where carbon depletion is occurring should be considered a critical ecosystem in need of restoration.

For every 1% decrease in soil organic matter, the water holding capacity is reduced by approximately 60,000 gallons per acre. Moreover, a decrease in organic matter is also associated with a loss of soil structure and the rate of water infiltration. You do the math…the increased stormwater runoff quickly becomes a very large volume that can contribute to downstream flooding, instability of roads and infrastructure, and even loss of life. The more runoff, the more erosion, the more sedimentation of streams and impoundments, and the more pollution of surface water.

Despite the simplicity of "re-growing" soil carbon, this least expensive of strategies for restoring critical ecosystem functions (for the purpose of cost-saving and potentially life-saving stormwater management) is neither a priority nor even a consideration in most political, regulatory or business circles. The science community has begun to document that this soil carbon depletion is linked to regional drought, reduced food production yields, and a cascading effect on local and regional economies.

Often, the first step in ecological restoration is to remove the competition of invasive species which then allows the installation of native species to increase biological diversity and stability. Here, technicians driving a Marshmaster are herbiciding cattails that had formed a monoculture in a marsh at the Indiana Dunes National Lakeshore. Photo by Jack Broughton

Where do we find critically-depleted soil carbon? Commonly, the depletion occurs where poor forestry or agricultural practices are followed, and where ineffective erosion control occurs. Or it occurs where fertilization programs in agricultural lands accelerate the decomposition of organic carbon. However, in the past several decades, we also find decreasing soil carbon in urban landscapes such as residential yards, golf courses, parks and the like.

Depletion is now being documented in arctic and boreal ecosystems that hold some of the largest soil carbon stocks on the planet in their peat and muck soils, and that were once believed to be stable. It is also occurring in some saturated coastal and tropical areas (e.g., Pocosin wetlands in North Carolina, Indonesia, etc.).

The scale of the problem

For every ecosystem function or resulting ecosystem service, we can find more examples of ecosystems in need of restoration than healthy ecosystems that do not need human intervention. This applies at nearly all scales, from urban backyards to the global biosphere.

Pollination is another classic example. This is a valuable ecosystem service that has been provided primarily by insects, bats and birds. Today, we find that this function – this free service of nature – is dramatically declining. In some locations, particularly drought-stricken areas, it has ceased altogether.

Both the pollinator and plants in these critical ecosystems are entering a dance of slowly spiraling decline. We must consider the critically significant role of this depredation, not only in our own self-defense but also on behalf of virtually every other fruit, pollen eating, and plant eating creature on the planet…and all the animals that eat plant eaters—in other words, all life on the planet.

The loss of pollination as an ecosystem service can cause economic loss of hundreds of billions of dollars from reduced fruit and vegetable production. Critical ecosystem restoration must be focused on protecting, enhancing, restoring and even re-creating habitat to harbor pollinators where their essential habitat needs have been depleted over time through land use changes, chemical agents, drought, and the complex interaction of these and other variables.

Big scale, big picture

One perspective on critical ecosystem restoration is that we should provide renewed opportunities for ecosystems to regain health and functions because we understand this is critically important for our human economy and health. But, broader than that is a perspective of what we do not yet understand. As we peer behind the curtains and learn what meager understandings we presently have about ecosystem services, we have gained a starry-eyed sense that there is a lot more to this than we ever imagined.

We are only beginning to appreciate how little we understand about what constitutes a critical ecosystem. For one, the scale of our

human impacts is finally being recognized. Consider many of the changes on the land we have made. Over time, the changes we have imposed on ecosystems – changes that were seemingly good ideas at a small scale – now, at increasingly larger scales, are having a wide range of significantly undesirable outcomes.

For 30 years, researchers from AES and the University of Wisconsin-Stevens Point have collected data on avian response to wildfire in the wilderness areas of the Boundary Waters of Minnesota and Quetico Park in Ontario. Interestingly, they've found that bird diversity actually increases in the first years post-burn. Photo by Steve Apfulbaum

In our recent book, "Restoring Ecological Health to Your Land", forest ecologist Dr. Alan Haney and I have refined a process for restoring critical ecosystems, including forests and savannas, developed by more than 35 years of experimenting with land restoration. In our research for the book, we were astonished (perhaps, naively so) to discover that with regard to forests, there is little focus on restoration. Whereas forestry practices have improved dramatically over the past hundred years, success is still most widely measured by short-term productivity, often to the detriment of ecosystem services.

The majority of forest management is geared to either market demands or non-commercial uses. While there is nothing wrong with these drivers, we wondered what forest management would look like if its highest priority was the restoration of forest ecosystems, and if consumable, market-focused products were by-products of such a strategy. Could the sum of the value of restored critical ecosystem services, plus the value of sustainable harvest of commodity products, equal or exceed the conventional marketplace value of more exploitive strategies? The answer has to be yes, as durable financial and ecosystem returns, over time, are more valuable than short term withdrawals that result in the depletion of critical ecosystem services and functions.

Conclusion

Forests, grasslands, wetlands, rivers, lakes, oceans, estuaries, and even deserts are all critical ecosystems hosting a vast diversity of life on earth. We are just beginning to appreciate that critical ecosystem restoration is needed in our terrestrial ecosystems, wetlands, and even streams and estuaries. We must also remember that what we do in upland ecosystems directly impacts critical lowland ecosystems – wetlands, lakes, rivers, estuaries and oceans.

Critical ecosystem restoration applies to all types of ecosystems and at all scales. We need to scale up our thinking to help foster, nurture and steward critical ecosystems to restore and preserve their critical ecosystem services.

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Woody Energy Crops: A Sensible Source of Clean Energy

By John Kitchen

Willow sprouting in June of the second year following first coppice
Photo by John Kitchen

It's no secret that we need more clean energy. What's not so well known is the contribution purpose-grown woody biomass crops can make to a sustainable energy future in North America. Short rotation crops of hybrid shrub willow, for example, can produce large volumes of woody biomass and provide an array of environmental and socioeconomic benefits.

Establishing the life-cycle economic benefits of short-rotation woody crops (SRWC) is critical to their adoption and widespread use. And in that respect, some hurdles remain, including scarcity of capital, underdeveloped supply chain, lack of knowledge and misunderstanding of environmental impacts. Nevertheless, considerable progress is being made in North America in developing this sensible source of renewable energy.

Turning to nature's oldest renewable fuel

What I find both interesting and exciting is that the International Energy Agency estimates that bioenergy could sustainably meet 25% to 33% of global energy demand in 2050. Indeed, the global use of biomass for energy is increasing continuously and has doubled in the last 40 years.

Yet, only 6% of Canada's energy needs are met by bioenergy, according to the Canadian Bioenergy Association. In Northern Europe, a region physically similar to Canada, the corresponding figure ranges from 12% to 20%. Why? Mostly because of different approaches and attitudes.

Most Canadians still consider bioenergy as a means of disposing of industrial and forest waste. This is changing quickly, however, especially in the forest industry, where significant efforts are underway to expand current practices. Even so, the projected growth in residue and waste streams in Canada is low, and won't allow us to tap the full potential of bioenergy. The quality and availability of these waste streams, moreover, is highly variable. Perennial energy crops such as willow and poplar, on the other hand, can be a predictable and reliable source of fuel. So they're ideally suited to supporting sustained growth of bioenergy.

Producing carbon neutral energy

When it comes to displacing fossil fuels, woody energy crops have the potential to make a big impact on global carbon cycles. Carbon permanently stored in the soil and roots offsets carbon emitted by fuel use during crop establishment, while the growth and conversion of the fibre is a closed-loop cycle.

Proper agricultural management of large-scale crops is critical to realizing environmental benefits and long-term productivity. While there are many agricultural systems for woody crops, and many different species, the majority of willow crops are grown in a manner similar to row crops like corn and beans. Willow is planted in a twin-row system to match conventional row-crop equipment and energy crop harvesting equipment. Like other farm crops, willow requires full light and use of available soil moisture, so weed suppression is critical during the first two years. After that, willow's robust root system supports rapid early growth that pushes new shoots past weed competition and shades out the ground. This ancient crop system is known as a coppice, or dense thicket of plants, because each plant re-grows vigorously after being cut back. Soil nutrients are replaced by recycling ash from combustion, along with modest applications of nitrogen.

The SRWC system is geared toward efficient harvesting and involves lower

New Hollander Harvester chipping willow
Photo by Larry Smart

labour, machinery and chemical input than traditional agricultural row crops. Willow crops are ready for harvest every two to four years, depending on climate and precipitation. The stems are cut and chipped in a single-pass operation using a forage harvester equipped with a specially designed cutting head. Other harvest options, including billeting and baling, can extend shelf life and provide drying advantages. Mean yields range between 6 and 15 dry tonnes/ha/year, with many harvests possible from a single planting.

Tapping underutilized farmland

Where will we grow these crops? The good news is we don't need to displace food crops to grow woody energy crops. In a study of biomass potential in the United States, the US Departments of Agriculture and Energy estimated that 55 million acres of land are available for energy crops, without affecting food and feed production, including US food exports. In Canada, about 20 million hectares are deemed suitable for SRWC, according to Natural Resources Canada.

Energy crops provide an important alternative for land where farmers need economically viable crop alternatives. Agriculture, of course, includes non-food crops, like cotton and street trees, that are as essential as energy. Furthermore, energy crops need not be a permanent land-use conversion. They can be removed after their 25 to 30 year lifespan, leaving the land improved with increased organic matter from leaf fall and root growth.

Establishing a viable economic model

The production of heat by direct combustion of biomass is the leading bioenergy application throughout the world. Modern conversion technologies are both clean and highly efficient, with willow and poplar well suited to these technologies.

The economics of SRWC are impacted by many factors, including site conditions, establishment costs, growth rates, and harvesting and delivery costs. The bulk of crop costs are incurred during establishment, so SRWC economics are sensitive to yields. For instance, a 50% increase in crop yield, can more than double the internal rate of return. Once established, though, the long-term costs of SRWC are low and predictable.

Corporate and government strategies for meeting carbon reduction and other sustainability priorities can have a positive impact on economics. These include the Pacific Carbon Trust in British Columbia that buys carbon offsets or initiatives like Alberta's Climate Change Strategy.

Socioeconomic benefits may be difficult to measure, although no less important. International consulting company Ecorys Group estimates that woody and herbaceous energy crops will lead to the creation of 80,000 jobs in Europe by 2020. Because of the short supply chain, most of these jobs are local, which helps boost rural development.

The process of valuing SRWC also needs to measure the sustainability of woody crops compared to the fallow or underutilized land they

Six row Willow cutting planter
Photo by John Kitchen

replace and to competing fossil-fuel systems. Dr. Tim Volk of the State University of New York (SUNY) and his colleagues provide an excellent perspective on valuation in their article "Growing Fuel: a sustainability assessment of willow biomass crops", published by the Ecological Society of America in 2004.

Growing renewable energy

The energy crisis in the 1970s sparked considerable work on SRWC in North America and Europe. Today, many North American agencies are collaborating to advance woody energy crops, including continued use of willow varieties bred by the late Dr. Louis Zsuffa and colleagues at the University of Toronto. SUNY has continued Dr. Zsuffa's work, breeding elite varieties, testing production and agronomic models and developing equipment. Elsewhere, Dr. Larry Smart has expanded breeding of willow for energy crops at Cornell University, as has the Institut de Recherche en Biologie Végétale at the Montréal Botanical Garden, Agrinova in Alma, QC, and Agriculture and Agri-Food Canada's Prairie Farm Rehabilitation Agency.

Natural Resources Canada Wood Fibre Centre is developing production methods and integrated uses, such as effluent treatment and land reclamation for Canadian markets. Many Universities are contributing with valuable work on everything from planting density to carbon flux. The regional forestry centres of Natural Resources Canada have developed a broad knowledge base, with projects underway in nearly every province in Canada.

At least a dozen Canadian companies, meanwhile, are working to define and advance best practices for commercializing integrated energy solutions using SRWC. This work includes dedicated energy crops and projects that integrate environmental services, such as biofiltration and residuals treatment.

Short rotation woody crops are not the silver bullet for producing clean energy or breaking our dependency on oil. They are one of several options that a small but growing number of dedicated individuals believe have immense potential for carbon mitigation, environmental services and farm diversification.

Consider, for instance, the following scenario: a community surrounded by uneconomic farmland; a community seeking cost-effective treatment of biosolids or effluent; a community with an opportunity to provide low-cost heat for commercial or institutional buildings, or better yet, an opportunity to site a new industrial plant requiring carbon-neutral woody biomass feedstock. Common to all of these is a variety of residue biomass sources with typically unpredictable cost or supply, or both. With the right values assembled and balanced, a dedicated energy crop could be the missing piece in a carbon-neutral or carbon-lean solution for each of these scenarios, and a sensible one, too.

John Kitchen is President of Bionera Resources Inc., a provider of energy crop advisory services and elite plant cuttings for woody biomass crops. Bionera is a wholly owned subsidiary of PRT Inc, North America's largest producer of container-grown forest seedlings. For more information, visit www.bionera.com.

Western Canada

by John Betts, Executive Director, Western Silvicultural Contractors Association

This summer forestry contractors held two regional silviculture market summits: one for the B.C. Coast Region in Campbell River and another for the B.C. Interior and Alberta in Kamloops. As in past summits, the focus was on the opportunities and challenges facing the sector. It was evident there is general optimism about future opportunities, not only in planting, but in forest restoration and plantation tending.

The ongoing recovery of the forest industry has seen a recent rise in planting work in BC after hitting the bottom in 2010 at 180-million seedlings. This year the WSCA estimates over 200 million seedlings will be planted in BC and we forecast an additional 35-million for 2012, bringing next year's annual sum of 235 million in line with historical levels of the past decade. This is good news for planting contractors and nurseries.

Although funding has been inconsistent and strategic forest management thinking at both the federal and provincial levels remains well behind events on the ground, there is general optimism that publicly funded forest restoration work will continue to grow. The necessary public impetus towards provident forest policy will require immediate management of stands, including increasing brushing and spacing in many parts of the western provinces, to mitigate the falldown effect on the timber supply from the beetle plague.

Millions of hectares of degraded forests will also need treatment to preserve habitat and other values. More burning homes make the need to mitigate the growing wildfire threat undeniable and funding is required to replant stands burned by fire. An emerging robust bio-energy sector represents another set of potential silviculture clients. Even the tortuous proceedings to establish carbon markets indicate possible silviculture activity.

Despite the long and short-term opportunities for enterprising and determined silviculture firms, those attending the meetings also pointed out that in the current depressed market several key challenges facing the sector are emerging

- Increased costs for fuel, equipment, and general operating have not been reflected in negotiated or open tendered prices for services;
- Increased costs for safety and environmental systems have not been reflected in prices;
- Both the availability of new workers or the retention of trained, competent experienced workers has steadily decreased --more rapidly than the decline in the volume of work-- over the past several years .

There was general agreement on the need to seek better pricing to reflect increased operating costs. But the most extensive discussion related to the workforce challenge. As the WSCA first tracked in a 2006 survey, contractors are reporting that experienced workers have begun leaving the industry again at a higher rate than the usual turn over. Even more acute are the sudden drop offs in applicants for work, which some normally busy firms have reported as near zero for this year. These are very serious leading indicators of a pending loss of capacity across the sector. Implicit in this decrease are concerns around worker safety, work quality, increased supervision, and increased training costs.

A key bellwether was identified as the wage rates for planters. For the last ten years WSCA has compared figures available from WorkSafeBC, government sowing numbers and Statistics Canada. Wage rates have declined on a per tree basis by about ten percent over the last ten years as an overall average, when adjusted for the cost of living index, the overall actual decline in worker wage rates is nearly 30 percent since 2000.

The general insistence by many clients to plant trees within a shorter and shorter window, particularly in May, has also depressed the number of productive planting days available to workers. Sufficient and contiguous working days are a critical factor in maintaining a reliable seasonal workforce.

There was also discussion of the challenge for recruiting and retaining good workers in the face of the continuing nation-wide coverage of the criminal behaviour of Khaira Enterprises. It has been a year of bad news. Bad news for Khaira's former workers and bad news for the industry. It is hard to estimate just how many workers this has kept away from the sector and how much it has undermined public confidence in forestry despite British Columbia having some of the best silviculture employment regulations, camp standards and worker safety programs in Canada, if not the world.

The Forest Safety Auditor has recommended that stronger enforcement of these regulations is required. Everyone involved in the sector, from contractors to contract administrators, regulatory agencies and purchasers of silviculture services, have a responsibility to ensure we maintain a healthy sector by undertaking the due diligence and follow-up required to ensure that the highest standards are maintained for a safe, productive and rewarding work environment.

For the most part, both the coastal and the interior sessions finished on an optimistic note that the sector will succeed in meeting its challenges and achieve success given the variety of opportunities that are now emerging. However, contractors will need to be focused on addressing the cost structure for both their operations and their employees in order to foster a viable contracting community employing a healthy, productive and fairly rewarded workforce.

Alberta

By Chris Valaire RPF, EP

Year of the Fire

Most Canadians observed the devastating impact of uncontrolled wildfires on the news every night as Alberta faced one of the worst fire seasons in the province's recent history.

In spite of spending millions of dollars on fuel abatement programs and FireSmart initiatives around the town of Slave Lake, Alberta Sustainable Resource Development (ASRD) was unable to control the head fire intensity due to 100km winds and tinder dry conditions. It literally was the 'perfect storm' of forest fire conditions.

The wildfire forced the complete evacuation of Slave Lake's 7,000 residents and destroyed roughly 40% of the town; 374 properties were destroyed and 52 damaged in the town. The town hall was completely destroyed by the fire, as was the library and radio station. The hospital, Royal Canadian Mounted Police station and schools remained standing. However, the insurable damage was estimated at $700 million, making it the second costliest insured disaster in the country's history.

As of August 31st, 2011, 977 fires burned 940,044ha, of area in Alberta; significantly more than our 5 year average, certainly making this the year of the wildfire in Alberta.

Considering these fires burned on crown land in/or adjacent to Forest Management Agreement (FMA) areas, this certainly has a profound impact on industry Annual Allowable Cut (AAC) and the ability of company to meet its legal obligations.

There is a stigma around the use of fire as a tool in silviculture management. However, in the upper and lower foothills of Alberta, lodgepole pine has been regenerating this way for the thousands of years. In fact, if you dig a soil pit in western Alberta, most would have the presence of charcoal from historical forest fires.

The Forest Resource Improvement Association of Alberta (FRIAA) was established to promote and initiate projects that enhance Alberta's forest resources. FRIAA manages the Wildfire Reclamation Program (WRP), the Mountain Pine Beetle Program (MPB), and the Fire Hazard Reduction & Forest Health Program (FHRFHP) among other programs.

In the case of a catastrophic wildfire, FRIAA funding, generated from stumpage revenues, plays a critical role in regenerating burned areas and legislative obligations for a free- growing stand are reset for the company.

Prescribed burning as a regeneration and fuel reduction tool is observing somewhat of a re-birth, since people see it as a method of reducing the probability of more intense and catastrophic wildfires and facilitating regeneration of disturbed crown land.

Setting aside habitat creation, and reduction of forest pests such as MPB, fire has always been a valuable tool in a forester's management toolbox. Unfortunately, because in the past, some prescribed burns have become uncontrolled and all fires involve unsightly burning (smoke/soot), utilization of fire as an effective management and regeneration tool has been reduced due to public outcry and misinformation.

In Alberta, the use of stump side processing and drag scarification has been highly effective means of regenerating cutblocks in lodgepole pine-dominated stands, when compared to more aggressive site preparation. An even distribution of serotinous cones that are ecologically suitable for the opening, are uniformly distributed across the cutblock. Fine and coarse woody debris is left as critical ground level habitat that also acts as an excellent temperature regulator.

> "Prescribed burning as a regeneration and fuel reduction tool is observing somewhat of a re-birth..."

On average, Alberta plants 70-80million trees/year, so in an economically constrained forestry sector, natural regeneration utilizing alternative harvest systems, scarification methods and fire emulation harvest planning, makes sense for a variety of ecological and economic reasons.

Silviculture foresters are examining alternative methods such as aerial seeding, seed tree retention harvest systems, and strip cutting/ commercial thinning to reduce silviculture costs while maintaining current AAC levels.

It is interesting and ironic that the forestry sector and various governments have spent considerable time, energy, and financial resources fighting forest fires. This is certainly understandable to preserve fibre sources, lives, and infrastructure. However, as silviculture foresters, we should examine fire as a management tool that can reduce regeneration costs, achieve desired regeneration outcomes, create habitat and possibly minimize the chance of more frequent and catastrophic wildfires.

As with other provinces, Alberta wants to align prescribed burning operations and localized mountain pine beetle infestations. In addition, industry is permitted to exceed spatial harvest sequences (SHS) in order to deal with infestations.

Chris Valaire is a council member and past-president of the College of Alberta Professional Foresters and can be reached at chris.valaire@swg.ca.

Québec

par Shanie Lévesque-Baker, Association Des Entrepreneurs en Travaux Sylvicoles Du Québec

Début de saison incertain pour les entrepreneurs sylvicoles

Figurant parmi les années plutôt difficiles en regard à la quantité de travaux alloués, 2011 n'aura pas été de tout repos pour les entrepreneurs en travaux sylvicoles. En effet, ces derniers ont dû se faire entendre auprès des deux paliers gouvernementaux afin d'assurer des emplois à leurs travailleurs.

La raison principale de ce ralentissement est assurément la crise forestière qui sévit depuis déjà quelques années. Les travaux sylvicoles dans les forêts du domaine de l'État étant payés à même les redevances que l'État perçoit des coupes forestières et les coupes ayant drastiquement chutés dans les dernières années, cela a inévitablement un impact sur la réalisation des travaux sylvicoles. Résultat : les travaux sylvicoles sont à la baisse et la crise touche maintenant tous les secteurs de la foresterie.

Interpellée par l'AETSQ et les autres associations, la ministre des Ressources naturelles et de la Faune, Mme Nathalie Normandeau, a ainsi annoncé le 31 mai dernier, un investissement de 35 millions de dollars, via le Programme d'investissements sylvicoles.

En juillet, face à la situation toujours critique, le ministre de l'Agence de développement économique Canada, M. Denis Lebel, a également dû allouer 20 M $ sur deux ans. Cet investissement devait supporter les communautés des régions touchées par la crise, et du même coup, sécuriser les entreprises par la réalisation de travaux sylvicoles supplémentaires.

L'aide accordée par les deux gouvernements a donc permis de réduire les conséquences de cette année difficile au sein de certaines régions, où des entrepreneurs ont durement ressenti le ralentissement économique qui touche le secteur forestier depuis déjà quelques années.

Un été pauvre en incendies de forêts

Contrairement à l'été 2010, où 700 feux de forêts avaient ravagé plus de 220 000 hectares de forêt québécoise, 2011 fût remarquable par le faible nombre d'incendies de forêts s'étant déclarés. Au moment d'écrire ces lignes, 248 feux avaient été dénombrés, pour un total de 2 390 hectares de forêt. Cette situation favorable au Québec a cependant permis à une quarantaine de sapeurs québécois de venir en aide à nos voisins de l'Ontario, aux prises avec des feux importants.

Nombre de feux et superficies affectées, 2009-2011

Année	Nombre de feux	Nombre d'hectares
2009	441	17 948,0
2010	707	223 357,8
2011	248 *(en date du 31 août)*	2392,9 *(en date du 31 août)*

Source : SOPFEU

Outre le faible nombre d'incendies de forêts, le beau temps était au rendez-vous, favorisant ainsi le déroulement des travaux, et le respect des échéanciers.

Rendez-vous de la forêt privée

Conviés par la ministre Nathalie Normandeau, les principaux intervenants en forêt privée ont été invités à échanger sur l'avenir des forêts privées, le 30 mai dernier, à Québec. Cet exercice, qui avait également eut lieu en 1995, 1998, et 2006, était l'occasion de revisiter les façons de faire pour le développement des forêts privées du Québec.

L'AETSQ était présente à ce Rendez-vous, afin de faire valoir les positions des entrepreneurs exerçant en forêt privée. Le président de l'AETSQ, M. Pascal Audet, a donc profité de ses droits de parole pour refléter l'opinion de nos entrepreneurs sur les points suivants :

- Étendre la certification PGES à la forêt privée;
- Définir clairement le statut des groupements forestiers comme entreprise collective, et surtout, application de celui-ci;
- Créer un système d'évaluation de la performance, rigoureux, standardisé, et public;
- Obtenir un siège auprès des agences régionales de mise en valeur des forêts privées, pour les conseillers indépendants.

Somme toute, cet exercice fût très enrichissant pour l'AETSQ, qui assistait pour la première fois à cette table. Dès lors, les différentes propositions devront être reformulées en bonne et due forme par le MRNF, pour que dès cet automne, le Forum des partenaires provinciaux travaille à la mise en place de ces décisions.

Consultation sur les forêts de proximités

En juillet 2011, la ministre des Ressources naturelles et de la Faune, Mme Nathalie Normandeau, annonçait la tenue d'une consultation publique sur l'implantation de forêts de proximité du Québec. Les partenaires du secteur forestier, ainsi que les communautés autochtones, et les intervenants locaux seront donc invités, dès cet automne, à se prononcer sur les pistes d'orientation proposées.

Cette politique, prévue pour le printemps 2012, promet d'amener les acteurs locaux à s'impliquer dans le développement de leurs forêts, en leur déléguant la gestion et l'aménagement des forêts les entourant. Pour ce faire, le Ministère des Ressources naturelles et de la Faune espère mettre en place environ 85 forêts de proximité à travers la province.

Rappelons que ces forêts de proximité sont de superficies variables, situées près des municipalités ou des communautés autochtones, et font partie du territoire forestier public.

Quebec

translated by Teri Shaw

An incertain start for silviculture entrepreneurs

Even considering the little work available recently, 2011 has been a particularly difficult year for silviculture workers for a number of other reasons. As a result, silviculture entrepreneurs took a stand to ensure jobs for their workers and were heard by two levels of government.

The principal reason for the industry slowdown is, without a doubt, the forestry crisis that has been plaguing the business for the last several years. Silviculture is a domain funded by royalties paid by logging companies, and, as logging has declined in recent years, silviculture has inevitably felt the impact. The result is that silviculture work has diminished and the crisis now affects all forestry sectors.

Challenged by the AETSQ and other associations, the Quebec Minister of Natural Resources, Ms. Nathalie Normandeau, promised an investment of 35 million dollars via the Silviculture Investment Program on May 31st.

In July, faced with a critical situation, the minister of the Canadian Agency of Economic Development, Mr. Denis Lebel, was obliged to allocate 20 million dollars over two years to silviculture activities. This investment is meant to support communities in regions touched by the crisis and, at the same time, stabilize companies allowing them to perform additional silviculture work. The funds allotted by both governments buffered some of the impacts of the this difficult year, though entrepreneurs in some regions still experienced hard times due to the economic slowdown of the forestry sector as a whole.

A summer of few fires

Unlike the summer of 2010, when 700 forest fires ravaged more than 220 000 hectares of Quebec forest, 2011 has been remarkable in that very few fires have been reported. At the time of writing, 248 fires have been recorded, affecting a total of 2 390 hectares of forest. The lull in the fire season in Quebec allowed for 40+ Quebecois fire-fighters to come to the aid of their Ontarian neighbours who have been battling significant fires this season.

Number of fires and surface area affected, 2009-2011

Année	Number of fires	Number of hectares
2009	441	17 948,0
2010	707	223 357,8
2011	248 *(dated August 31st)*	2392,9 *(dated August 31st)*

Source : SOPFEU

Meeting on private forests

Invited by Minister Nathalie Normandeau, the main players in the private forest sector got together on May 20th in Quebec to discuss and exchange ideas about the future of private forests. The convention, which took place previously in 1995, 1998, and 2006, was an occasion to revisit the development strategies for private Quebec forests.

The AETSQ attended the convention in order to ensure the perspectives of private sector entrepreneurs were heard. The president of the AETSQ, Mr. Pascal Audet, took the opportunity to listen and comment from the position of our entrepreneurs on the following points:

- Extending PGES certification to private forests,
- Defining the status of forestry groups as 'collectives' and how they should be applied
- Creating a performance evaluation system that is rigorous, standardized, and public
- Obtaining a seat in regional agencies to enhance private forests for independent advisors

All in all, this exercise was quite valuable for the AETSQ given that it was their first time in attendance. For the time being, the different propositions will have to be reformulated by the Ministry of Natural Resources so that the provincial partners' forum will be able to start putting them into action this fall.

Consultation on local forests

In July 2011, Ms. Normandeau announced that a public forum would be taking place regarding the planting of local forests in Quebec. Partners of the forestry industry as well as representatives from the First Nations community and local stakeholders will be invited this fall to contribute their opinions about the proposed directives.

This policy, expected to be implemented by spring 2012, promises to involve locals in the development of their forests by delegating to them the management of the forest in their immediate area. To that effect, the Ministry of Natural Resources hopes to establish approximately 85 local forests across the province.

It should be noted that these local forests are of varying size and situated in proximity to First Nations municipalities and communities and make up part of public forest territory.

Nova Scotia

by Andrew Fedora, Federation of Nova Scotia Woodlot Owners

Nova Scotia is currently working on a new Natural Resources Strategy. After compiling information from stakeholders, experts and the general public over the last three years, Nova Scotia Department of Natural Resources (NSDNR) released a high-level document in August 2011. "The Path We Share: A Natural Resources Strategy for Nova Scotia, 2011-2020" outlines some of the measures NSDNR will be taking in the coming months to reshape how Nova Scotia manages its natural capital.

"To back up their efforts, the province has allocated funding for landowner education and outreach..."

The report and strategy development process was broken into four main categories; Biodiversity, Parks, Geological Resources and Forests. Given that forestry is a predominant industry in Nova Scotia, it is no surprise that the "Forests" piece has received the most attention.

One of the more ambitious strategic initiatives outlined is a commitment to reduce clearcutting in the province by fifty percent over the next five years - a worthy goal fraught with many challenges. The biggest challenge is balancing the needs of industry with a strong public demand for changes in industrial forestry practices.

There are situations where clearcutting can be the most appropriate treatment, both ecologically and economically; but its overuse as a blanket site prescription in Nova Scotia has made the term synonymous with 'bad forest management'. NSDNR is in the uncomfortable position of trying to meet public expectations for better forest management without significantly reducing the wood supply to an already burdened industry.

Part of the plan is to re-engage small-private woodlot owners. Nova Scotia is 70% privately owned; small-private landowners own approximately 49% of its productive forests. Over the last number of years, there has been a significant decrease in the amount of landowners who are actively managing their lands and marketing wood fibre. By encouraging landowners to manage their woodlots, it is hoped that this will offset any reduction in wood supply due to tighter harvesting regulations.

To back up their efforts, the province has allocated funding for landowner education and outreach, support for forest certification and an injection into the provincial silviculture program. They have committed $5 million/yr over the next three years. While this is certainly welcome news, the recent closure of the New Page Ltd pulp mill in Eastern NS has cast a long shadow over the Natural Resources Strategy and subsequent funding support.

For many eastern Nova Scotia contractors and landowners, New Page was their only market. The mill also ran the largest silviculture program for the region. The absence of this market and related silviculture funding, coupled with the day-to-day challenges already faced by the forest industry, has created deep concern over the future of forestry in the province.

The NS Government announced an additional $15 million in early September 2011. The funding is a stopgap measure targeted at keeping forestry contractors and other skilled staff in place until a buyer can be found for the mill.

The mill itself is state of the art with an excellent shipping port; it also comes with a very enticing Crown wood fibre agreement. New Page's decision had less to do with the viability of the mill and more to do with the parent company being over $3 billion in debt and filing for bankruptcy protection. That's not to say it would be easy to reopen the mill and turn a decent profit. The issue of private wood supply remains. There is also the issue of exorbitant electricity rates charged by Nova Scotia Power (NSP).

As of mid September 2011, the Province has been in talks with NSP and is actively seeking a buyer for the mill. They have also enlisted an expert on global forestry markets to help determine how best to manage and market Nova Scotia's wood fibre.

Andrew is the Executive Director of the Federation of NS Woodlot Owners and can be reached at info@fnswo.ca.

New Brunswick

by Ken Hardie, New Brunswick Federation of Woodlot Owners

The Woodlot Owners I work for, and the seven regional Marketing Boards that are members of our organization, have a history of over 25 years of delivering and administering silviculture programs. As well as program delivery, there are countless Individual efforts by woodlot owners implementing treatments outside current program criteria. Woodlots represent 30% of the 5.8 million hectares of forested land base in New Brunswick but that 1.78 million ha is all productive forest.

Since 1999, woodlots have received silviculture funding support from the provincial government, with the inclusion of some federal dollars at various times, typically on a year to year basis. Current funding is from a $6 million provincial program and the last two years of federal funding (through Atlantic Canada Opportunity Agency) of an additional $1.75 million/year from the Federal Community Adjustment Fund, has, sadly, ended. The program's woodlot criterion has essentially duplicated the provincial crown criteria since 1999 used for even-aged management which includes pre -commercial thinning and planting activities, (site preparation, planting and tending). Over the last five years, woodlot owners and marketing boards have averaged 10,640 ha per year of silviculture treatments on NB private woodlots. Pre-commercial thinning accounts for approximately 58% of that activity. Over the last five years, these silviculture programs have created over 2600 jobs per annum.

As the program administrator, the NB Federation of Woodlot Owners has requested funding for alternative activities and uneven aged treatments for many years. Our woodlot members have been asking for it. I am pleased to report that for the current 2010 – 11 season a pilot program of uneven aged management, selection harvest, commercial thinning and shelterwood treatments is now supported by the Department of Natural Resources. Though we will do a limited number of treatments the associated data will be used to examine the benefit of more treatments. As well as influencing management findings will be assessed against criteria for restoring Acadian forest species.

The NB government has spoken positively in support of the woodlot sector, and its potential to restore Acadian Forests through the silviculture program.

"The NB government has spoken positively in support of the woodlot sector, and its potential to restore Acadian Forests through the silviculture program."

Another challenge has been to secure a multi-year funded agreement for silviculture. Our traditional even- aged activities are also challenged due to a decline in harvesting activities of over 60% since 2005. The aging demographics of silviculture workers is also a challenge. We have to ask ourselves, where will the silviculture workers of the future come from? Not from her New Brunswick if there is no innovation, uncertainty or inadequate funding to sustain forest health.

Ken is the manager of the New Brunswick Federation of Woodlot Owners and can be reached at nbfwo@nbnet.nb.ca.

Forest Health

By Laura Machial, Staffan Lindgren and Brian Aukema

Is red band needle blight a climate change canary?

Introduction

The prevalence of red band needle blight among its host, lodgepole pine, is seemingly unprecedented and because forests are dynamic ecosystems that constantly undergo change from disturbance and succession, causality is very difficult to determine. Disturbance agents are both abiotic (e.g., fire and wind) and biotic (e.g., insects and pathogens). Forest ecosystems disturbed by biotic agents tend to be wetter, limiting the frequency and size of fires but the influence of biotic agents in dry forests with a short fire cycle under fire suppression can also be significant. Biotic disturbance agents' range of spatial and temporal scales are from very large and sudden (e.g. epidemic mountain pine beetle) to very small and slow (e.g. individual trees killed by root pathogens).

Dothistroma septosporum is a fungus that attacks the needles of pine species and causes red band needle blight disease. The red banding on the needles is due to the fungi's production of a toxin, dothistromin (Figure 1). This fungus normally causes small to intermediate scale disturbances, but the magnitude and severity of disturbance varies widely with host and environmental factors. *Dothistroma* has been causing disease in exotic pine plantations in the southern hemisphere since the 1950s and has been particularly destructive on radiata pine plantations in New Zealand (Gibson 1972). The fungus is also found in northern hemisphere countries, including the United Kingdom, the United States, and Canada where it causes disease on both exotic and native pines (Funk and Parker 1966, Cobb and Miller 1968). In North America, where the fungus is normally found on native pines, there have been few recorded outbreaks and damage was minimal until recently.

Dothistroma was first recorded on pine species in British Columbia in the 1960s (Funk and Parker 1966, Parker and Collis 1966) but was not considered an important pest due to infrequent and small scale outbreaks on native hosts. In the late 1990s, the fungus was observed in northwestern BC and by 2002 aerial surveys in that region identified the disease (Figure 2) in over 90% of the lodgepole pine plantations, with damage ranging from low levels of infection in some stands, to almost complete mortality in others (Woods 2003, Woods et al. 2005). Red band needle blight continues to be a serious problem in that region, and has also been increasing in severity in the central interior of BC.

The severity of damage caused by *Dothistroma* on exotic pine plantations in the southern hemisphere is easily explained by the lack of resistance in exotic pines. In southern hemisphere plantations, where the host, and most likely the fungus as well, have been introduced, the host has not evolved resistance or tolerance to attack by the fungus. However, in BC, the change from an innocuous fungus causing little damage on native pines to a serious pathogen now causing considerable economic loss, is more difficult to explain.

The disease triangle (Figure 3) illustrates the key factors in disease development. A virulent pathogen, a susceptible host and conducive environmental conditions must be present at the same time and place, or disease is not significant. The change in impact caused by red band needle blight could result from changes in one or more of

Fig 1. Red bands on lodepole pine needles caused by Dothistroma septosporum infection. Photo by Kathy Lewis

Fig 2. Red band needle blight affecting mature lodgepole pine trees. Photo by Alex Woods

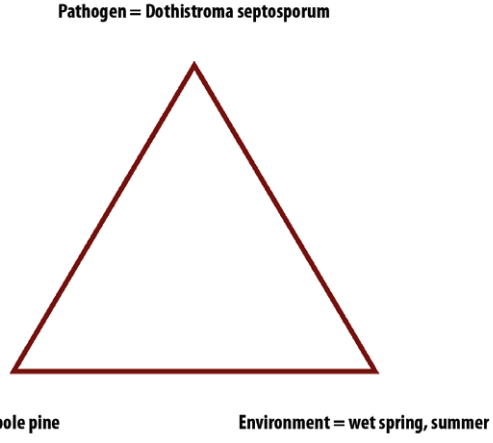


Fig 3. Disease triangle for red band needle blight

the points of the disease triangle. A new strain of the pathogen could have resulted from sexual reproduction, immigration or mutation in the pathogen population, the host could have become more prevalent or susceptible to the fungus, or the environment could have become more conducive to infection and colonization by the pathogen.

The host

There is no evidence to suggest that native lodgepole pine have become more susceptible to infection by *Dothistroma*. However, what has changed is the availability of the host. In the northwest BC where *Dothistroma* has been most damaging, natural forest stands are dominated by hemlock and subalpine fir, with spruce and pine as minor components. In managed stands because spruce and pine have been the preferred regeneration species for economic reasons, the percentage of lodgepole pine has risen dramatically, from approximately 9% in unmanaged forests, to 36% in managed forests (Woods 2003). Plantation management results in greater density of contiguous, even aged young susceptible pine, which can also contribute to disease spread. It is not surprising that economic impacts are greater when an outbreak of a disease occurs when the host comprises 36% of stand composition, compared to when it is 9%.

The Pathogen

Dothistroma produces spores asexually (which involves no genetic recombination), one to two years following infection. These conidia are released through early spring to late summer during moist conditions and are disseminated through rain splash (Peterson 1967, Gibson 1972). In regions of the world, such as BC, where the sexual stage has been observed (Funk and Parker 1966, Braun 2009), ascospore (the product of sexual reproduction and genetic recombination) production takes place over a one-month period during the summer. It has been shown by Groenewald et al. (2007) that isolates of the fungus originating from a single spore infection, contain only one of two mating type alleles, and that both mating type alleles are required in a population in order for sexual reproduction to occur. The fungus is able to survive and spread with only asexual reproduction, as is the case in many countries in the southern hemisphere. In New Zealand for example, a single clone is responsible for all of the damage caused by the fungus (Hirst et al. 1999).

In areas where both mating types exist, such as BC (Groenewald et al. 2007), sexual reproduction leads to genetic variability and the opportunity for new, more virulent strains of the fungus to appear, and for the fungus to adapt to overcome resistance mechanisms in the host. The sexual stage of the fungus is also known to be wind-borne, and can therefore contribute to long-distance dispersal of the fungus, and survival and recolonization following periods of unfavourable climate. To examine the population genetic structure of the pathogen in northwestern BC, Dale et al. (2011) used molecular techniques (essentially DNA fingerprinting) on samples from 19 different sites. They found relatively high levels of genotypic diversity, non-random mating, and evidence of clonal structure. All of this suggests a mixed-mode of reproduction in which both sexual and asexual reproduction occurs, and it does not support the hypothesis of a new, more virulent strain of the pathogen. However, at least during the current outbreak phase, the sexual stage of the fungus has been difficult to find either by dissection of fruiting bodies on needles (Braun 2009) or by spore trapping (Boateng 2011). Sexual reproduction is more costly energetically, and is often favoured during periods when the environment is not conducive to disease development (which is not the case currently), and this may explain the lack of direct evidence of sexual reproduction.

The climate

Disease development, sporulation and reproduction by *Dothistroma* are strongly linked to weather conditions (Peterson 1973, Braun 2009, Boateng 2011), and weather conditions over the past several decades have become more conducive to reproduction, dissemination and spread by the fungus. Woods et al. (2005) demonstrated a strong link between increases in summer precipitation, which were greater than normal decadal oscillations, and increases in disease spread and severity. Welsh et al. (2009) used tree ring analysis to identify past outbreaks of the disease as far back as 1830s (the extent of the tree ring record in that study), and they found that the current outbreak is much more severe, extensive, and synchronous among the study sites, than earlier outbreaks. Further, they found that more extensive outbreaks occurred in years with greater spring precipitation, and appeared to subside during periods of low spring precipitation. Recent work on spore production and dissemination in the northwest also confirmed that conidia are produced and dispersed when it rains, and that the amount of rain is less important than the rain event itself (Boateng 2011).

Management Implications

Collectively, the research described above substantiates the arguments by Woods et al. (2005) that directional climate change, exacerbated by an increase in host availability due to forest management practices, are the primary reasons for the magnitude and severity of the current outbreak. Relatively recent changes to stocking standards, specifically changes to species acceptability, that promote greater species diversity and a reduction in the proportion of pine allowed in the northwest, will help to reduce impacts by *Dothistroma*. Forecasted increases in summer precipitation for some areas in BC will lead to greater damage by *Dothistroma*, therefore it is imperative that forest management focus more on maintaining or enhancing species, ecosystem and genetic diversity, and less on economic drivers in order to promote ecosystem resilience to greater disease pressure. Care must be taken as well in planning and implementing strategies such as facilitated migration, to ensure that we don't introduce susceptible species or genotypes (Wallis et al. 2011), into areas where disease pressure is predicted to rise in response to climate change.

Kathy Lewis is Professor and Chair of the Ecosystem Science and Management Program at UNBC. She teaches forestry, natural resources management and biology courses and researches the ecological roles of biotic disturbance agents in forests and the influence of management practices and climate change on forest health. Kathy can be reached at lewis@unbc.ca
A full citation listing for this article can be found on our website.

Notes from the Field - Part II

By Robin Claire McCullough

Lukas Mouka and author, Robin Claire McCullough take a moment to refer to the map

In the Summer 2011 issue of Silviculture Magazine, I spoke of the work which silvicultural management staff do to translate the abstract, two-dimensional prescriptions of the future forest unit, into terms comprehensible to the workers upon whose labour the future forest depends. The foresters construct prescriptions in the language they do because they are members of a specific scientific community. This is a discourse community which governs the way in which the land – and the practices performed upon the land – may be meaningfully spoken about. As is inevitable when the world is packed into words – when something as materially diverse as a cutblock is symbolically or textually characterized – these words require translation, in order to be legible to those who must unpack them. Silvicultural management staff move back and forth between the scientific imperatives of the foresters, and the non-scientist treeplanters – those who actually execute the treatments designed to change the structure of Crown stands.

But as skillfully as management staff translate the language of forest science for the labourer, such translations can only ever operate at a representative – an abstract – order. In the final instance, it is always the labourer herself who must translate what she has been told into the material inscription: the trees in the ground. For the great majority of the time she does this, she will do it alone; as faithfully as she may carry with her the various translations guiding her actions, it is the individual labourer – at a one-to-one, non-abstracted order – who finally makes the future forest unit material. And at this ultimate stage, the language with which she must engage is not the scientific language of forest management, but the

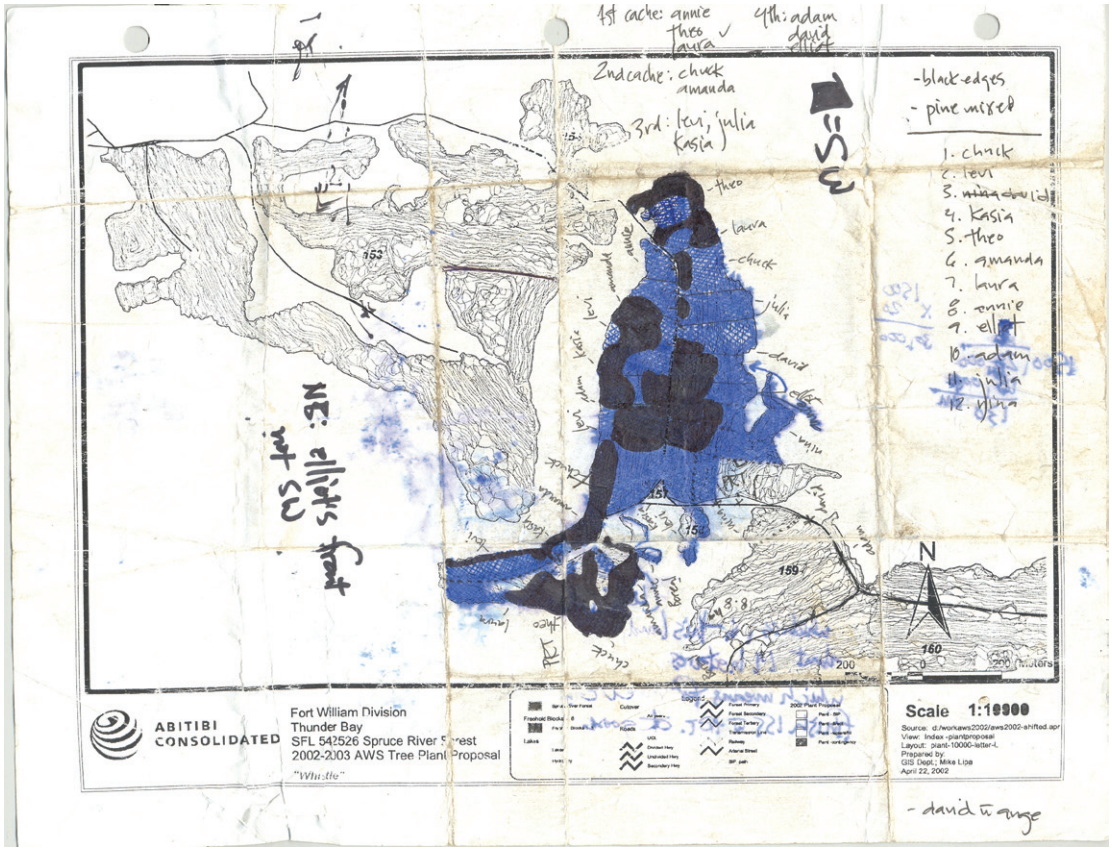
physical script of the cutblock's ground.

What the treeplanter sees – and what she feels on the blade of her shovel – was once the forest floor. Previous to its existence as a cutblock, the forest floor was not read, nor was it written into; its surface did not stand for the scientific appropriateness of the rooting medium it concealed. It is only in being translated, via the practices of industrial forestry, that the surface comes to be read as such. It is the silvicultural labourer who assumes the professional responsibility to ensure that the trees she inscribes into this surface are scientifically appropriate. If the script of the cutblock's surface were easy to read, planting 3000 trees a day would be a simple matter of motivation and endurance, rather than motivation, endurance, and an ability to determine the scientific appropriateness of the ground's material.

In an unscarified block, the appropriate rooting material is almost never at the surface of the ground. With the exception of post-wildfire regions – in which the covering material has been burned off – planting unscarified ground requires the labourer to negotiate through the surface material, in order to reach the appropriate rooting medium below. The surface material, therefore, functions as a code which must be learned – must be cracked – in order to access the information it contains. Every treeplanter, over the course of a single day, cracks thousands of sequences of scientific code. If she fails to decipher the code – if she plants a tree in the wrong material – she has committed a scientific error. The material she has chosen was scientifically wrong; wrong by the criteria which the foresters have determined must be in place in order for these trees to renew and enhance the forest crop. This code – the language of the cutblock's surface – is one which takes most planters years to learn to read and write with fluency. And in many regards, it is a planter's fluency in this language which determines her capacity as a planter. If she is adept at reading and writing within this script, she will be adept at planting trees.

But – this is not always true. On the Spruce River Forest, in the Northwest Region of the Ontario Ministry of Natural Resource's Thunder Bay District, the greater part of the land into which the planter will throw her shovel has already been translated. The code of its surface has been broken, and a new script written across the same space. This is the script of scarification, which for the majority of blocks on the SRF is achieved via the particular actions of the Bracke Two-Row Mounder. Scarification of any type is not only performed in

order to aid plantation survival and growth; it is also performed in order that the task of puzzling out the cutblock's surface will be largely eliminated. Scarification is intended to both translate this surface, and to overwrite it, in order that the labourer may gain direct access to the rooting medium of the ground. The treeplanter may therefore determine the scientific appropriateness (or inappropriateness) of the ground without having to read the language of its surface cover. Trees planted in scarified ground are always paid at a lower price than trees planted in unscarified ground, to adjust for the code-cracking work already performed by the mattock wheels of the Mounder.



In overwriting the surface of the cutblock, however, scarification presents another language, one which must also be learned by the treeplanter. Just as the labourer may be more or less fluent in the language of the block's surface, she may be more or less competent in her reading of the language of scarification. The lines inscribed by the Mounder – as with any written language – may themselves be inscribed either legibly or illegibly. On paper, planting a tree high in the corner of every bracke seems reasonable; in the world, it is the rare bracke that corresponds dependably to its symbolized representation. Out on the cutblock, the script of each individual bracke is one which must be deciphered; this is a process, a series of actions and decisions which must be made and taken while in negotiation with the particular network which comprises the cutblock.

These are the performative translations and inscriptions which never sound like much, but which, if there is a "green hell" of treeplanting, are the flames of this hell. No diagram, no prescription on a piece of paper, can ever really represent what it feels like to have to crash through broken trees and torn rocks just to properly – scientifically – inscribe a single nine-cent tree in the high corner of what anyone would agree is a stretch to call "a bracke" – if anyone else actually negotiated with the network of the cutblock all the way here. No one else ever does, and this is the professional imperative of the treeplanter: the obligation to performatively engage with the cutblock on a non-negotiable, one-to-one level.

This is what silvicultural workers do, and on the Spruce River Forest, between 2001 and 2006, they did it "promptly and with appropriate prescriptions…in a highly satisfactory manner."What was inscribed symbolically in the early days of May was, by the end of June, a series of things in the world.

A Century of Expansion Following the Outbreak Trajectory of the Western Spruce Budworm

By Lorraine Maclauchlan

Budworm larva
Photo by Lorraine Maclauchlan

Forested ecosystem's intrinsic rhythms are punctuated by small almost imperceptible events such as annual growth, ingress, scattered mortality, wind throw and innumerable other changes. But crescendos of pivotal succession are manifested by catastrophic events such as insect and disease outbreaks, wild fires and extreme weather events. Bark beetles are among the highly visible agents of succession, killing patches or entire landscapes, permitting regeneration and renewal. Changing climates cause these events to leave bigger footprints through the ongoing mountain pine beetle, *Dendroctonus ponderosa* Hopkins, outbreak.

Other disturbances, including the western spruce budworm (WSB), *Choristoneura occidentalis* Freeman, can also cause major impacts to our forests but are more subtle in their *modus operandi*. The budworm spread looks like amoebae as they expand and contract over landscapes. The damage they leave ranges from chronic, almost imperceptible, light feeding to the total denuding of trees and stands in a single season.

With the decline of the mountain pine beetle in many parts of British Columbia, both harvest and silviculture opportunities are diminishing in these ecosystems. As a result there has been renewed interest in the management of our low to mid-elevation Douglas-fir forests. The Interior Douglas-fir biogeoclimatic zone (IDF) dominates the low- to mid- elevation landscape of south-central interior B.C. and extends into Alberta, Montana, Idaho, Oregon and Washington (Hope et al. 1991) as does the range of WSB.

WSB is a defoliating insect native to Douglas-fir forests of B.C. and the Pacific Northwest. Budworm outbreaks have been recorded from coastal B.C. through the central interior into the western Kootenay Mountains. Coastal and Interior Douglas-fir is the budworm's primary host but they also feed on and damage other species such as Engelmann spruce, larch, hemlock and pine when grown in mixtures with Douglas-fir. Due to the budworm's preferential feeding on the current year's buds and foliage, height growth is severely reduced or eliminated during years of defoliation. Severe defoliation over several years often causes upper crown mortality, known as top-kill, and may lead to the formation of stem defects (Van Sickle et al. 1983; Alfaro and Maclauchlan 1992). The budworm can have extremely devastating effects on fir stands, by reducing overall growth and yield, increasing susceptibility to other insect pests and diseases, and limiting management options. Defoliation periods may last for several years, before subsiding to endemic levels.

The story of WSB in B.C. is interesting and one that may chronicle our changing climatic patterns. WSB has less predictable population fluctuations than other defoliating insects, with outbreaks lasting several years or collapsing after only one to two years. B.C. has good historic records of budworm outbreaks going back to 1909 that help illustrate outbreak patterns. The first recorded outbreaks occurred on Vancouver Island in the early 1990's with no outbreaks since on the island. Thomson and Benton (2007) attribute the cessation of WSB outbreaks on Vancouver Island as possibly due to warming sea temperatures that promote early larval emergence and thus poor synchrony between insect and host tree spring flush.

Western spruce budworm damage outside of Princeton, BC. Photo by Lorrain Maclauchlan

Since the 1930's all WSB outbreaks have occurred in the interior of B.C. The Coast Region has experienced very regular, periodic budworm outbreaks since 1940, but the scale of outbreaks has decreased over the past two outbreak cycles. The dry canyon forests near Lillooet have the longest and most regular, chronic, outbreak cycles with five distinct outbreaks in the past century. Each outbreak ranged from a few thousand, to over a hundred thousand hectares of annual defoliation.

Although budworm can occur in most Douglas-fir dominated ecosystems, there are still some areas where there appears to be no history of WSB outbreaks. A project looking at WSB outbreak dynamics was published in 2006 (Maclauchlan et al. 2006) and at that time there were large areas in the south, and in the central Cariboo-Chilcotin, where WSB had never reached outbreak levels despite having ample, susceptible host. The Thompson Okanagan has seen large, often sustained outbreak periods, but these have all occurred within the past three decades. Prior to the 1970's the budworm seldom reached outbreak levels in this part of the interior.

The budworm story continues to get more interesting and more convoluted. Budworm is present at low levels in most susceptible forest types. However these insect populations appear to not reach what we define as outbreak proportions unless certain stand conditions are met or some event triggers the insect. Budworm was first mapped in the Cariboo Region in 1974 but only over a small area and no outbreaks were recorded until the late 1990's. Once the budworm population expanded it spread rapidly, mingling with existing endemic populations throughout the Cariboo-Chilcotin.

The Cariboo budworm outbreak is one of the largest and most sustained outbreaks ever recorded in B.C. The most recent chapter in the budworm saga now has populations expanding north between Williams Lake and Quesnel and into the Kootenay Bounary Region in the south of the province. The Quesnel budworm population marks the most northerly outbreak yet recorded. Similarly, outbreak populations built in the Princeton and Merritt areas in the past decade where historically there also had been little or no records of outbreak level populations. What are the triggers? What are the impacts and repercussions?

WSB larvae feed primarily on buds and new growth but in very high populations can back-feed on the older foliage thus causing more severe damage in that year. The budworm has a life history closely tied to the phenology of its host and small fluctuations in annual weather patterns can have significant repercussions on either the insect's or trees health. Small larvae hatch out of eggs laid in the upper canopy of mature Douglas fir and disperse throughout the canopy where they overwinter. The following spring budworm larvae emergence and once again disperse seeking buds to penetrate and consume. If budworms disperse too early in the spring, usually due to an early warm spell, they cannot penetrate the buds and are forced to mine old needles, causing high levels of insect mortality.

Budworm populations are strongly influenced by favourable weather, allowing them to increase locally or spread over extensive areas. Climate change may result in more frequent favourable weather

Budworm feeding damage.
Photo by Lorraine Maclauchlan

and therefore more frequent outbreaks. A warming climate may allow for a more synchronized emergence with host phenology in more northern and higher elevation sites where suitable hosts are available. However, budworm may become less successful at warmer, lower elevations due to asynchrony with tree development as observed on Vancouver Island.

Why should we care about budworm outbreaks? The insect is native to B.C. and outbreaks are drivers of succession. One reason is simply scope - over 51% of the Interior Douglas Fir (IDF) has a history of budworm defoliation - meaning there is room for the infestation to grow! Compared to other ecosystems, the majority of known budworm outbreaks (>68%) occur in the IDF. Not only climate has influenced the trajectory and success of the budworm. Over the past century in B.C., humans have dramatically changed the density, structure and even composition of our inland forests.

The budworm thrives in dense, layered stands with a scattered mature canopy. Fire suppression since the mid-1900's and selective harvesting has moulded IDF forests into this highly susceptible state. In response to this situation a management strategy was developed to address high hazard budworm areas. Part of this strategy incorporated aggressive spray programs using the biological insecticide *Bacillus thuringiensis* var. *kurstaki*. The program targets highly susceptible, multi-layered Douglas-fir stands with high budworm populations. Usually stands can sustain a year or more of defoliation so stands are targeted in year 2 or 3 of an outbreak.

The program started as operational trials in 1987, with less than 1,000 ha treated, and has grown to programs now averaging 40,000 to 70,000 ha annually (about 10% of annual outbreak area). Spraying is a short-term treatment and consideration must be given to the long-term management of Interior Douglas-fir in light of the budworm and other issues such as root disease, bark beetles and fire. The return on investment for controlling budworm is significant, but longer-term management such as thinning dense, suppressed Douglas-fir stands should also be in the tool box.

In conclusion, the WSB is reacting to our changing climate and increasingly favourable and available host resource. Current budworm outbreaks are distinguished by their expansion into higher elevations and new territory. This change in outbreak dynamics is a response by the insect to milder, more suitable climatic conditions and altered stand conditions. As the climate warms, budworm may continue to expand in range toward the limit of its primary host, Douglas-fir. At the moment we have some tools for controlling extreme damage, but these may prove inadequate with exacerbated climate change.

Lorraine Maclauchlan is a Forest Entomologist with the Ministry of Forests, Lands and Natural Resource Operations based out of Kamloops and also teaches entomology at Thomson Rivers University. Lorraine received her Ph.D. from Simon Fraser University and has since worked primarily in the Southern Interior on a diversity of forest insect pests. Her research over the years has taken her throughout the province investigating such topics as mountain pine beetle attacking young pine and defoliator outbreak dynamics.

Dogs and Silviculture

Root Diseases and Timber Dogs

By Lori Eckhardt and Todd Steury

Opie searches for root fungi and digs at the spot of detection. Photo by Yuan Zeng

The three major root diseases in the southeastern United States are characterized by thin crowns, chlorotic foliage, reduced radial growth and premature tree mortality. While, Pine Decline and Littleleaf Disease are characterized by the deterioration of fine roots, only Pine Decline is associated with the dark staining of lateral roots. In contrast, Annosum Root Rot is characterized by lateral root infection and decay. Reports of Pine Decline and mortality syndromes have been increasing in the past thirty years in many areas in the southeastern United States. Pine tree decline, like many forest declines, is a result of complex interactions of biotic and abiotic stressors. Current studies of pine stands in the southern United States with trees expressing symptoms of decline show strong associations with the presence of root-feeding bark beetles and the presence of *Leptographium* and *Ophiostoma* fungal species that tend to stain root tissues and clog phloem and xylem. *Ophiostomatoid* species are commonly associated with various root-feeding bark beetles, which attack stressed and, sometimes healthy-appearing trees. These insects serve as vectors introducing these root-staining fungi into tree roots or as wounding agents creating infection courts which permit the infection by these fungi. In addition, some Leptographium and *Ophiostoma* species are known to be virulent pathogens under appropriate field conditions. The level of pathogenicity (especially for the undescribed species) and the specific role of these fungi with respect to southern yellow pine are still uncertain.

Root disease is very, very, very difficult to locate and study as the infection process takes place under ground where insect feeding is not visible. Disease and therefore pine decline is normally not apparent until you see above-ground symptoms in the crown and by then, it is often too late to save the tree. However, using detection dogs may give us an advantage. A detection dog is a canine trained to work using its senses to detect substances such as explosives, illegal drugs, or blood. In the past decade, the use of detection dogs has expanded from these more traditional targets to a number of ecological targets. Detection dogs have successfully been trained to find live animals such as desert tortoises and brown tree snakes, dead animals such as bats and birds along power lines, scat and other sign from many animal species, and plants such as lupine and invasive spotted knapweed. For example, in the state of Florida, dogs were trained to detect pythons in the everglades. The Bumblebee Conservation Trust trained detection dogs to find bumblebee nests. Detection dogs have been trained to search for many substances, including: bedbugs, cancer, DVDs, currency, explosives, mobile phones, firearms, human remains, mold, plants, animals, produce, drugs, diabetes, and termites. One notable quality of detection dogs is that they are able to discern individual scents even when the scents are combined or masked by other odors. A sniffer dog can detect blood even if it has been scrubbed off surfaces. So WHY NOT use dogs to find root disease?

One key benefit of using detection dogs is that dogs greatly increase detection rates, improving the ability to study and manage species. Just how good are detection dogs at finding their target? Recently, two dogs worked on a study of bobcats, coyotes, and gray foxes in Kentucky. The goal of the project was to collect DNA from individuals so that population-size estimates for the species could be generated. Two sources of DNA were to be used: scat, located using the detection dogs, and hair, collected using hair snares (barbed wire surrounding a bait). During the 4 weeks that the dogs were in Kentucky, they found a combined 261 scats. By comparison 100 hair snares returned only 7 samples during the same period. As another example, dogs were used, as well as game cameras, to assess black bear habitat use in Apalachicola National Forest, Florida. The dogs found scats in 48% of sampled transects, while only 20% of game cameras detected bears. In a study of bobcats in New Mexico, detection dogs located 56 confirmed bobcat scats (plus another 15 scats that couldn't be confirmed with DNA) compared to only 5 bobcats detected using cameras and 1 bobcat detected using hair snares. Finally, in another study in New England, detection dogs were 3.5 times more likely to detect black bear, fisher (a large weasel), or bobcats than other methods.

As the greatest mobile detection system known, dogs can provide an efficient means to searching large areas to locate fungal species or signs of fungi. Using detection dogs could afford an early detection system, allowing the identification of infected stands before above-ground symptoms are evident. By decreasing manpower (in the field and in the lab) and search time, while increasing detection success, detection dogs can really improve the efficiency of a search. Predictions are that operational use of these dogs could assist land managers in determining management strategies based on the percentage of infection in a stand.

The Forest Health Dynamics Laboratory in the School of Forestry and Wildlife Sciences at Auburn University has recently partnered with the EcoDogs Program in the Animal Health and Performance Program to train detection dogs to find pathogenic fungi growing in pine tree roots. Two Labradors, Charm and Opie, now belong to the 'Timber Dog' Program housed within the EcoDogs Program and have been in training for the past year learning how to detect Leptographium and Grosmannia species responsible for Pine Decline and *Heterobasidium irregulare* (formerly *Heterobasidium annosum*) for Annosum Root Rot. Initial training began using teaching aids consisting of fungi grown on pine twig agar. Subsequent training used fungal infected bolts and artificially infected roots in designated forest training stands. Operational trials took the dogs to stands on industrial property, some known to be infected and some not known to be infected. Positive hits made by the dogs were marked and sampled and negative controls were taken from tree roots in the dogs search path. Nearly all (97-100%) of the samples found by the dogs tested positive for fungi, while none of the negative controls tested positive. A team of dogs is currently operationally available for lease through the EcoDogs program and a second team is in training.

Lori Eckhardt is an Associate Research Professor of Integrated Forest Pathology and Entomology in the School of Forestry and Wildlife Sciences at Auburn University. Lori is the director of the Forest Health Cooperative and co-director of the Forest Health Dynamics Laboratory. Questions or feedback can be directed to Lori Eckhardt eckhalg@auburn.edu.

Todd Steury is an Assistant Professor of Wildlife Ecology and Conservation Biology in the School of Forestry and Wildlife Sciences at Auburn University. Todd is a co-founder of the EcoDogs Program. More information about the EcoDogs can be found at ecodogs.auburn.edu.

Silviculture Dogs

By Sara Johnson

I have two dogs, Gypsie and Jessie. They are 9 years old and have worked in the bush with me since they were pups. These dogs were cast offs whose lives I may have saved by adopting them and who certainly saved my life on at least two occasions.

Our day begins when the alarm goes off in the morning. They look at me with curious eyes to see if I put on my fancy pants, or if I reach for the dirty bush pants. If it's the latter, their tails slowly wag with hope, waiting for me to say the magical words "Bush day boys, lets go to work". It's hard not to feel excited for work myself when I see them jump and prance with the thought of a day in the bush, if you can imagine a 100 pound dog 'prancing' and smiling, that would be Jessie.

For them, work means chasing deer, swimming in swamps, barking at squirrels, hunting mice and begging for bits of food from the planters' caches. But they also know it means protecting me from dangerous encounters with bears, which my pathetic human nose and ears never notice until the last minute.

I've so often heard people say "Dogs attract bears and cause trouble", and maybe for some dogs this is true. It certainly wasn't the case for me the day I nearly walked onto a bear on a fresh kill. The wind was blowing towards me. I did not see the bear, and it did not see me. Gypsie smelt the bear first but not before we were in trouble. He then stepped in front of me, forced me to stop, and then pushed back into me, backing me up. That is when I saw the bear; it was hunkered down on a dead moose, right in my path, 100m ahead. The dogs were silent, and they stayed right at my side while we walked quietly back to the truck. They knew not to bark and

Author Sara Johnson with Gypsie and Jessie. Photo by Richard Brown

threaten the bear, and walked me back like bodyguards ensuring my safety. If not for the dogs I would walked right into trouble.

The second time they saved my life is a day I will never forget. It was early spring, there was still snow everywhere, and I was not thinking about bears – no bear spray, nothing. I stopped at a south facing block where the snow had melted. I had no real 'work' to do in the block, I just was itching to walk in the sun, on the dirt, and touch the trees – they were growing great! I walked right into a black bear, emerging from its den under an old stump. The dogs were chasing a squirrel a few hundred meters away. I started backing up and yelled for the dogs to come back. The bear was walking towards me, eyes focused right on me, and I knew I was in serious danger. The bear didn't sniff, didn't snort, and didn't stand up. There was no bluffing, no curious scoping me out; it was full on, predatory black bear behavior.

Then the bear charged. So I turned and ran, all the while screaming. The bear experts say don't run, don't scream …. I wonder if they have ever been charged by a predatory black bear. So quickly the bear was right behind me. I turned to fight. The bear was lunging towards me, and I stepped sideways and fell. I could smell the bears' breath on me, our eyes locked together. I thought 'OK this is it'. Then I saw Jessie leaping through the air, he jumped onto the bear from the side. The bear was so focused on me, that it hadn't noticed the two dogs charging towards it. The bear spun at the dog, and I was free. I ran to the truck, Gypsie right behind me. Sure, Gypsie could have outrun me but he was running right behind me, protecting me in case the bear came back. A minute later, which seemed like hours, Jessie returned, unhurt, my hero. That night the dogs ate steak for dinner. .

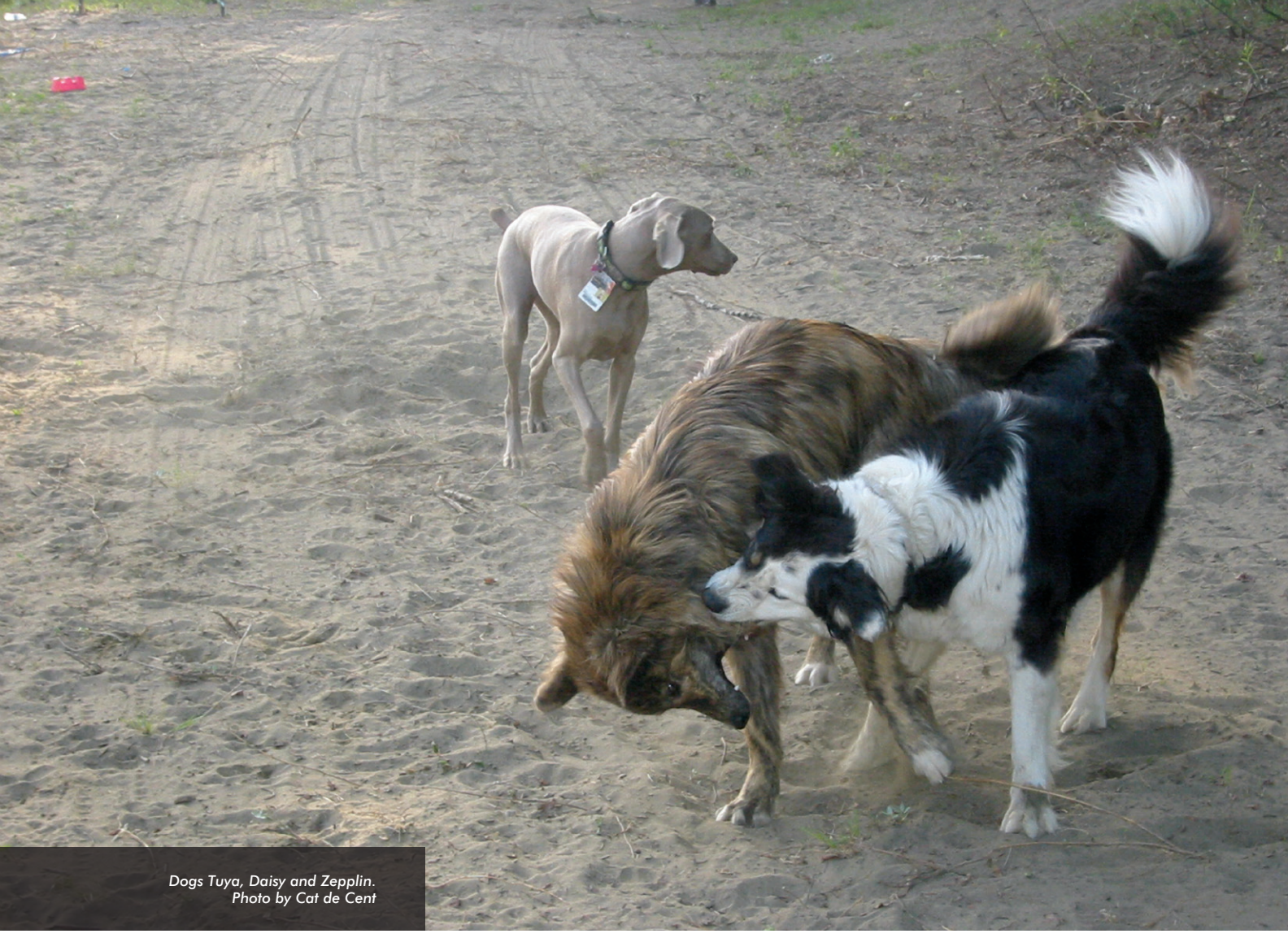
There are some rather unpleasant things associated with bringing dogs to work. Like today, when Gypsie proudly brought me a now wounded bunny he caught. A work truck that smells like wet dog might not be everyone's favourite coffee shop, but for me, it seems a small price to pay and I have grown to like the smell,

If you're thinking of getting a dog for the bush, do some research and find a dog that will fit with your lifestyle. Respect them, love them, and your returns will be tenfold.

Gypsie is a spaniel, healer, border collie cross; whose hobbies include eating cheese and chasing squirrels.

Jessie is a black purinese, border collie, shepherd cross; whose hobbies include belly rubs and sneaking up on planters getting them to scream "BEAR".

Sara is a silviculture forester for West Fraser's regeneration obligations whose hobbies include living with Gypsie and Jesse. She can be reached at sara.johnson@westfraser.com.



Dogs Tuya, Daisy and Zepplin.
Photo by Cat de Cent

It's a Dog's Life...

By Cat de Cent

Tree planting camp is a dog's Disney World with large blocks for running around, deer, moose and birds to chase, sticks to chew, willing planters everywhere to scratch you and throw sticks and best of all, a tree planting cook to give you bacon leftovers. I have never been in a camp that didn't have at least one dog, with 15 as my record on a coastal contract where they stayed in camp all day - an alert posse who followed my every move. I am, without a doubt, extremely grateful to have such watchful companions. Tree planting cooks get up while the rest of a camp is in its deepest sleep cycle and along with the privilege of being first to see the planets, night rainbows, shooting stars and rising dawn, cooks are also first to see the bears; often as they are running right toward us, or out of the mess tent or once, attempting to open the door of the cook shack. Bears and cooks, cooks and bears….we go together like peanut butter and jam, separately delicious and yet still inevitably winding up together. Given the remote location of Canadian planting camps, some 5 hours up a rugged logging road or an hour by boat into an isolated inlet, we are the intruders, tenants in other creatures' wilderness. Respecting your hosts can get you pretty far; keeping food out of tents, maintaining tidy caches and keeping all the garbage in a secure trailer away from the main body of the camp are crucial when living with bears. Sometimes, however, all the careful steps you take are not enough and the bears cannot withstand the temptation. That is when camp dogs are indispensable. Dogs are hilarious, loud and smelly, and often annoying to humans, but they are even smellier, loud and more annoying for a bear. Dogs will sense when a bear is around camp long before we will, barking into the air and running fast along the periphery of the tree line tells us we have a visitor. When I was charged by a confused bear early one morning as I went to start the generator, my 20 week old puppy, Daisy, took it on and redirected the bear into the mess tent where it only destroyed the coffee maker and the stereo. I also watched Daisy get between a bear and one of the children in camp who was walking with her babysitter. To see a small dog charge a large bear up a hill and chase it back into the forest is an amazing validation of the security of a good dog in camp. Camp dogs keep visiting inspectors safe when they are alone on the blocks and will alert planters and everyone to wildlife in the tree line. They are our entertainment, protectors and friends. For that I am more than willing to smell like bacon for half the year and have these watchers ever present.

Cat de Cent is a tree planting cook, endlessly in love with the tree planting life and whose exploits can be followed at bakedinthebush.blogspot.com.

Focus on Safety

By Barbara McFarlane, New Brunswick Forest Safety Association

Stuck on the first day. Photo by Jeremy Cohen

Alberta Ruts. Photo by Steven Mueller

Driving Change

You don't need a safety consultant to tell you that the greatest risk to silviculture workers is driving. Any tree planter can tell you that. Heading out to camp, riding to work in the crummy, backing up to the reefer, or running to town for supplies; most incidents causing significant loss will likely happen on (or off) the road. Granted, silviculture workers are more likely to suffer injuries due to repetitive stress, or slips, trips and falls. However, the big ticket items - serious injury, fatality, major vehicle damages and costly production loss - are usually due to vehicle incidents.

The personal toll on workers and employers can be immense. I recently spoke to a silviculture contractor whose company experienced a serious incident. "It was the last day of the 2010 season and everyone was stoked. One second of driver distraction later and we had a seriously injured planter. At first, I felt personally responsible and I honestly considered shutting the company down. I'm so relieved that John (not real name) recovered and came back to work this season. After what happened, I wanted to do everything possible to make sure it didn't happen again. We really beefed up our training and our expectations for drivers and passengers. Everyone takes driving much more seriously now. It's paid off in better safety as well as lower vehicle damages."

Keeping employees safe is the right thing to do, but there is also a business incentive. Staying profitable is increasingly tied to reducing vehicle-related costs – injury claims, fuel expenses, vehicle maintenance, repairs, downtime, and etc.

Most employers have a basic safety management system in place that includes some driver training, abstract checks, safe driving rules and procedures, maintenance schedules, inspection checklists, and… well, that's about it. There are often other issues that aren't covered by employer safety programs but can carry huge risks:

- Work crews using company vehicles on days off for shopping, laundry, beer runs, etc.
- Employees driving their own cars / VW vans / 70's era campers from town to bush camp
- Supervisors using their own vehicles for work and reimbursed mileage by the company
- New drivers not qualified for difficult driving conditions
- Fatigued drivers, especially supervisors
- In-cab distractions such as MP3 players, GPS units, satellite radios, etc.
- Loose items in cabs and unsecured loads in truck boxes or trailers

If you haven't addressed all of these issues, you're not alone. Many employers need to rethink their company's overall approach to road safety. Traditional safety programs often make driving just one task among many. I think that the risks warrant a more focused approach where every aspect of road safety is addressed: the driver, the vehicle and the journey. Fortunately, you can access some key resources to help get you started on your journey.

Driver Training: The Western Silvicultural Contractors' Association (WSCA) is releasing an updated version of its Resource Road Light Truck Driver Training course in the fall of 2011. According to WSCA Executive Director, John Betts; the revamped course will have a greater emphasis on the operational skills needed

by novice drivers while still maintaining the focus on human factors that has made the training so valuable for novice and experienced drivers alike. Check www.wscacourses.ca for details.

National Safety Code for Silviculture Carriers: Download presentation by Kate Iverson, Transportation Safety with the BC Forest Safety Council at www.tinyurl.com/3h9ebta

Fleet Safety Management: The Occupational Road Safety Partnership, a joint project of WorkSafeBC and the BC Road Safety Foundation, worked with an industry Technical Advisory Committee to research international work-related road safety practices and adapt them for the BC context. Project Manager Deirdre Holmes says that the resource website will be available to all employers by late fall. "We are developing an easy-to-use web-based 'toolkit' to help employers assess road safety risks within their organization, identify risk reduction strategies, and develop a road safety action plan for drivers, roads and journeys. The toolkit will contain most everything required to implement, or improve, a worker-related road safety program." Sign up for newsletters and release announcements at www.occupationalroadsafetypartnership.com

Road safety and fleet management efforts are probably your best bet for a quick return on investment. Maybe it's time to change the perception that roads are our greatest risk, and start enjoying the rewards of safe driving.

Steven Mueller spent 23 years as a tree planter and silviculture contractor. He is also the former Director of Forest Worker Development with the BC Forest Safety Council. He currently works as a forest safety consultant, trainer and auditor. He can be contacted at www.stonewynd.com.

Quick Facts

- In BC, next to asbestos, vehicle incidents are the primary cause of work-related deaths. *(WorkSafeBC)*
- 35% of Canadian drivers aged 20-24 report that they have dozed off while driving. Male drivers are more than twice as likely to fall asleep while driving as females. *(Traffic Injury Research Foundation)*
- Research indicates that drivers using a cell phone fail to see up to 50% of the available information in their driving environment. *(Traffic Injury Research Foundation)*
- On average, every $1,000 in unbudgeted vehicle expenses denies the average silviculture employer the potential profit from 100,000 planted trees. *(Personal experience)*

Some Ideas to Get you Going

- Carry out an initial review of your road safety management practices to see where you are at (a helpful self-assessment tool can be found at http://tinyurl.com/3dnaafp).
- Conduct and document route hazard assessments when planning new projects. Communicate road hazards to drivers before they drive the routes for the first time.
- Do ride-along competency assessments with new drivers after training, and when new road challenges are encountered. Use a standardized tool and get veteran planters engaged in conducting the assessments and providing feedback.
- Ban all electronic device usage while driving, even hands-free cell phones. Drivers may need to call kilometres on resource roads, but, if possible, have a front seat passenger operate the radio to reduce potential distraction.
- Have drivers do a quick walk-around of their vehicle before backing up and use a spotter for more complicated maneuvers. Drivers should also give a quick horn honk a few seconds before moving their vehicle, to get the attention of nearby workers on foot or in other vehicles.
- Provide cargo nets to secure loads in truck boxes. Inspect cabs regularly for loose items.
- Purchase inexpensive portable GPS tracking devices that will capture vehicle data such as routes travelled (viewable on Google maps), top speed attained, average trip speed, distance travelled, and more. This data can be downloaded to a laptop for management analysis. Drivers who are exceeding safe speeds can be readily identified and corrected.
- Develop clear policies and practices regarding use of work vehicles on days off.
- Develop policies and guidelines for employees who use personal vehicles for work.
- Monitor supervisor work hours and take steps to provide adequate time away from work duties.

Reader's Lens

Photo by John-Eric Teehan

Photo by Dawn Brinkman

DO YOU HAVE A GREAT SHOT?
We'd love to include your photo in an upcoming issue of Silviculture!
Email
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