CANADIAN SILVICULTURE

SUMMER 2003

SITE PREPARATION

AERIAL FERTILIZING

WILD TREE SEED COLLECTION

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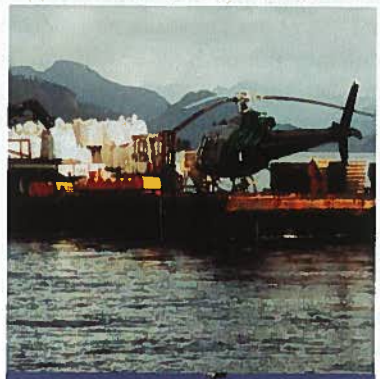

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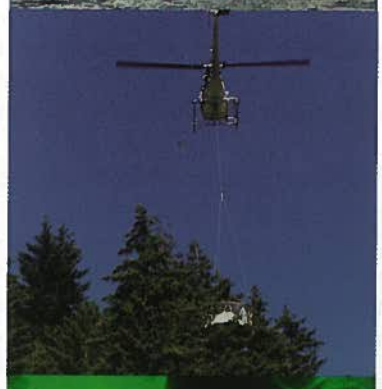

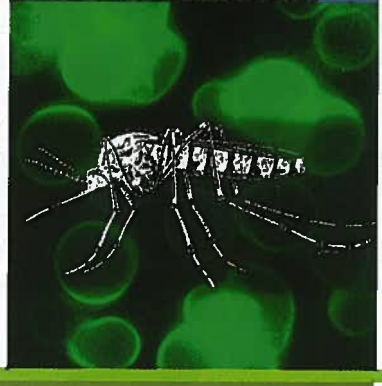

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EDITORIAL

by Dirk Brinkman

Congratulations to the BC Silviculture Industry

In June of 2003, BC's Forest Practices Board (FPB) issued a special report "Reforesting BC's Public Land—Evaluation of Free-Growing Success".

In October 1987, BC was the first province in Canada to require harvesters to reforest all areas harvested with an ecologically suited species mix, and then tend those trees until the stand can survive and grow into a healthy new forest. Today almost all provinces have similar requirements.

This report by an independent agency on the reforestation performance of a whole province is without precedent. Most similar reports were reviews by a provincial government ministry on its own performance, and so historically got lost in political spin, watering and doctoring. This report is independent, both because of the structure of the board, and because it is on industry's results based performance.

The FPB report reviewed whether

- BC's reforestation records were accurate
- cutblocks declared free-growing met the criteria
- free-growing areas were still free-growing in August 2002 and
- ground surveys found harvesters were compliant with the criteria.

It also reported how many cut blocks

- met the time period
- required amendments because they could not make the time period and
- did not meet the requirements and why not.

The 'free-growing state' is defined for each ecosystem in BC's Establishment to Free-Growing Guidebooks and the right to harvest includes a legal obligation to meet this state within a specified time period of 8 to 20 years from the date of harvest. August of 2002 was nearly 15 years after the obligations on the first harvest areas.

The FPB audit focused on the 6,488 cutblocks scheduled to reach free-growing before August 2002. This is 24% of the 24,560 cutblocks harvested across the province between October 1987 and December 1992.

The report found that

- BC's reforestation maps and data bases were accurate overall
- the 291 cutblocks selected from across the province for ground observation, because they had two or more risk factors, were indeed free-growing on the ground in August 2002
- the 291 cutblocks met the criteria, with stocking at or near target levels and only 4% of the cutblocks had stocking near minimums, only 1% of the net area with observable overtopping brush competition, and only one block with stocking that was less than the required height standards
- 85% of the cutblocks scheduled to, reached free-growing by August 2002
- 1.5% declared free-growing at their target date were no longer free-growing because of forest health problems
- 13.5% were not free-growing but were expected to reach free-growing within 1 to 7 years, 9% through amendments granted by the Ministry of Forests and 4.5% without amendments.

The board's commentary on this audit is worth reporting in its entirety.

"These early results from the first set of cutblocks harvested under the objectives of the silviculture regulation are very encouraging. They are the net result of the hard work and cooperation by licensee and government foresters, technicians, seedling producers and silviculture crews.

The science of forestry has become increasingly complex since the silviculture prescriptions for these cutblocks were written some 10 to 15 years ago. Other values, such as biodiversity and wildlife habitat, have gained importance and now get equal consideration to free-growing objectives. Practices such as large clearcuts, broadcast burning and herbicide application have become less acceptable. It may be more difficult to accommodate free-growing objectives in silviculture prescriptions in the future.

Forestry professionals in British Columbia have proved their success in achieving free-growing status on the ground. Their efforts need to be supported with information exchange, training, and research and development support to ensure that this good result continues.

Free-growing objectives were the first clearly established objectives in the Forest Practices Code. Free-growing status is a desired result with clearly specified indicators for measuring success. There are no legislated steps that must be followed to achieve it—professionals must use their judgment and apply appropriate prescriptions and treatments to obtain a free-growing stand of trees. The free-growing example provides a track record and reassurance that licensees and forestry professionals are up to the task, provided they have clear and measurable objectives to aim for, and measurable standards to assess progress along the way."

The Board's closing commentary to its special report is a great acknowledgement, and congratulations are due to everyone in BC's silviculture industry.

The success of the BC silviculture industry with the first results based environmental regulation in Canada, lends confidence in the trend towards an industry government sustainable forest management covenant embodied in a results based, rather than a practices based, code.

BC's audit also challenges all the other provinces to do an independent audit of their reforestation success.

SITE Preparation

by Laird Van Damme

In most Canadian jurisdictions managed forests require a planned approach to forest renewal following harvest. Forest renewal efforts are prescribed with consideration to site types, the type and condition of the harvested forest stand, and the desired future forest condition. Generally, hardwood forests regenerate naturally but many conifers require some assistance to ensure that they regenerate to their full potential. Site preparation is often a critical success factor in assisted regeneration especially when combined with direct seeding or planting of conifer tree species.

Site preparation accomplishes the following:

- Prepares seed beds or planting spots for tree establishment and growth by providing optimum soil moisture, temperature, aeration and nutrient conditions.
- Controls competing vegetation and some pests.
- Manages slash.
- Facilitates the control of desired tree density and spacing.

There are four main methods of site preparation:

1. Fire
2. Chemical
3. Manual
4. Mechanical

Figure 1a: Drags consisting of shark fin barrels and anchor chains

Fire can be an excellent site preparation method but air quality, safety and risk of wildfire issues have led to a decline in the use of this method. Variable results and delayed fire initiation times can also create problems for those who plan forest renewal projects.

Chemical site preparation

Swedish trials have shown

superior growth

for seedlings planted on the top of mounds.

is used extensively in the Maritimes and in various locations across Canada. This method has produced acceptable and cost effective results, especially on fine textured soils. A long-standing concern over the use of chemical pesticides in the natural forest has limited the acceptance of this method in many regions. Chemicals (principally glyphosate) are most often used to release conifer regeneration from competing vegetation. This regeneration is usually established following mechanical site preparation.

Manual site preparation is often accomplished on sites where the organic overburden is relatively thin and access for mechanical site preparation equipment is limited for a variety of reasons. Tree planters site prepare a planting spot by scraping away the organic overburden to plant a seedling in the exposed mineral soil. On many sites, this treatment is laborious and difficult for tree planters to perform for extended periods without injury. On some fine textured soils with thin organic layers (i.e. duff) seedlings are planted without manual site preparation. Although this technique avoids frost heaving, the results are variable and growth can be less than what can be achieved with site preparation.

Nurse logs and mosses can also be suitable seed beds or planting spots in some environments, especially moist ones. In these instances, site preparation if it used at all is primarily designed to manage slash to facilitate access for planters or to expose seed beds.

The vast majority of area site prepared in Canada uses mechanical methods. Mechanical site preparation exposes mineral soil to emulate natural fire and wind throw processes that conifer tree species have adapted to over thousands of years. Mineral soil conducts heat away from the surface layer, draws water up to the surface layer, discourages pests (i.e pine weevil) and controls competing vegetation.

The mechanical methods can be broadly classed into two categories based upon their pattern as follows:

- Continuous; mineral soil is exposed in a continuous line or furrow
- Intermittent; mineral soil is exposed in patches

Continuous patterns of site preparation can be made by blades, plows, drags and trenchers (Figure 1a). Trenchers are the most common form of continuous site preparation used across Canada (Figure 1b).

Figure 1b: Donaron 180 disc trencher

Continuous patterns can increase access for planters because slash is aligned in rows. Continuous patterns present a broad range of spacing options within the trench or furrow.

Intermittent patterns can be made by blades (i.e. dip and dive) and powered trenchers but is most commonly produced by patch scarifiers (Figure 2) and excavators. Excavators are used to make intermittent mounds in steep or wet terrain.

Intermittent patterns require greater care in selecting planting sites. Planting trees in the pit or low spot can lead to damage from frost and excess water, whereas this is less of a problem in trenches. However, intermittent patterns can produce superior growth in plantations provided the right planting stock and planting techniques are applied. Intermittent patterns also reduce erosion and run off. In addition, coarse woody debris from slash is left intact for wildlife habitat and ecosystem function. Intermittent patterns can also enhance the control of planting density because the distance between planting spots can be controlled by the machine.

Planting spots, either on mounds or patch/trench berms usually have the right mixture of soil moisture, temperature, aeration and access to nutrients to stimulate seedling growth. The duff layer incorporated or adjacent to the berm decomposes and releases nutrients for young seedlings.

Figure 2: Bracke three row patch scarifier/seeder

Swedish trials have shown superior tree growth for seedlings planted on the top of mounds. It is critical that the incorporated duff layer is completely sealed inside the mound to prevent moisture wicking and drying of the planted seedling. Mounding is relatively common in Western Canada and the technique may help reduce the need for chemical tending in other parts of Canada.

Seeding spots differ from planting spots. The ideal profile for seeding is a flat screef that removes the duff layer but leaves the upper soil horizons intact. These horizons have finer textures and organic material with favourable moisture characteristics to germinate seed.

The most widely distributed specialized site preparation tools being used in

Figure 3a: Mounder/scarifier

Figure 3b: Mounder/scarifier

Canada are manufactured in Sweden and Finland. As the tools progressed from relatively passive mechanical devices in the 1970s to sophisticated computer controlled electrical hydraulic systems available today, the control the operator has over the size and profile of the site prepared "microsite" has increased. For example, the mounders/scarifiers (figure 3a & b) can screef long patches for seed tree and aerial seeding systems and then be adjusted by the operator "on the fly" by pressing a button to produce compact mounds on wet or competitive sites scheduled for planting. The trencher (figure 4) can make shallow, deep or intermittent trenches with loose mounds.

Mechanized tree planting can be cost effective under certain conditions. A promising machine configuration used in Europe is being tested in Western Canada (figure 5). Despite the advances in tree plant machine technology, most sites prescribed for planting will be planted manually in Canada for many years to come, unless access or terrain conditions favour machine planting.

Simultaneous sowing of seed with mechanical site preparation has seen several design changes over the last two decades as has simultaneous applications of chemicals for vegetation control. These unique applications may expand as foresters become more familiar with the site conditions where these treatments can be used effectively. Direct seeded pines tend to have better root development compared to planted pine trees, and hence are more stable and less prone to wind throw. Some research scientists are concerned that the root development of planted pines will be a problem for wood using industries in the future as compression wood in the lowest parts of the tree boles are largely unusable. In addition, young seeded stands have structural characteristics similar to wildfire stands in the early stages of development that benefit wildlife.

Critical links in the chain of forest renewal success remain in the hands of foresters, site preparation contractors, seedling/seed stock suppliers and tree planters. It is essential that their expertise and efforts complement

Figure 4: Variable function disc trencher

each other. For example, mounds should be matched with container seedlings with long plugs to ensure root tips can access the humus layer at the base of the mound. Planters require training to identify the unique interplay between microsite selection and planting depth to match specific site characteristics to the seedling growth requirements (e.g. deep planting is best for mounds on dry sites but shallow planting is better on mounded wet sites). The versatility of these new tools requires operators to be trained to anticipate changing site conditions and to make the appropriate changes to the machine's settings to achieve the desired results. Foresters need to be aware of the range of possibilities to develop appropriate silviculture treatment prescriptions. Finally, scientists can help develop experimental designs to test the effectiveness of new treatments and further improve treatment applications while those in academia pass this knowledge and the means to build new knowledge on to the next generation of silviculturalists. In this manner, site preparation in Canada will continue to evolve with new thinking and new technology to ensure cost effective forest regeneration.

Figure 5: Bracke planter

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IMPROVING REFORESTATION SUCCESS

by Ronald J.F. Elder

Planting Technique & Microsite Selection

Assuming that properly conditioned planting stock with suitable characteristics for the site have been selected and other concerns such as timing and care in stock handling have been properly addressed, reforestation success will then depend to a large degree on correct planting techniques and placing the biological and physiological requirements of the seedling as the top priority.

Duff, LFH, raw, forest floor and non-site prepared planting are all terms currently being used to describe planting techniques in many areas. Regardless of the term being used what are we really trying to accomplish? How does this type of planting differ from what has been called "traditional" planting techniques?

The actual process of planting tree seedlings for the purpose of reforesting cut over lands is a relatively simple process – our goal is to place young nursery grown tree seedlings into spots in a forest environment where they will successfully establish and grow to create another forest some time in the near or distant future. However, historic responses to contractor or planter problems have made this simple process extremely difficult through the imposition of numerous "guidelines", standards, rules, terminology and interpretations. Many of these once well-intended requirements have lead to confusion at the operational level. Especially when they appear to fly in the face of basic biological and physiological plant needs.

This article is a basic review of understanding how a tree grows and more importantly how its requirements for optimal growth interplay. This understanding is vital to making sound decisions on microsite selection so that the seedlings critical needs can be prioritized above some of the confusing current terms that arise from historic contract standards and rules.

Temperature

Soils warm from the top down as water drains away and air temperature increases through the summer. Roots grow most effectively in soil temperatures of 10 to 25 degrees Celsius. Most early (spring) root growth takes place only in the top 2 to 10 centimeters of the soil profile where desirable temperatures first occur.

Seedling roots must be active and delivering nutrients to the tops in advance of bud break or the start of shoot growth. Roots not active prior to bud break leave seedlings susceptible to environmental stresses, often resulting

in a reallocation of energy resources to tissue repair instead of growth.

By mid-summer, lower soils have dried and warmed so that roots can grow deeper. Effective planting spots – microsites – will maximize the amount of time a plant's roots and tops are within optimal temperature ranges thereby extending the available growing season.

Moisture

Soils with high humidity levels, not free water, provide the optimum environment for seedling root growth. Such conditions are typically found on elevated microsites containing organic or organic-mineral soil mixes. Soil temperature is primarily a function of the amount of moisture present. Excess moisture reduces soil temperature and inhibits the availability of oxygen, required for respiration or active metabolism.

Nutrients

Forest stands predominantly occupy sites with mineral soils low in nutrients. The fertility present is largely supplied by the organic layers. Available nutrients are primarily found within the fermenting or actively decomposing layer of the organic mantle where beneficial root mycorrhizae or fungi are also present.

The litter or un-decomposed surface layer of the forest floor acts as a buffer to maintain the moistness in the fermenting layer below. Removal of the litter layer will result in drying of the fermenting layer, thereby reducing its available nutrient producing utility.

The humic or well-decomposed organic layer also contributes a nutrient supply and serves as a moisture reservoir supplying relative humidity to the fermenting layer. Thick humic layers can be a detriment to root growth as they often hold excessive moisture resulting in reduced temperature and oxygen levels similar to fine textured mineral soils.

Planting seedling roots where contact with the moist fermenting layer can be maintained will ensure that the root tips have immediate access to the nutrients needed for effective, rapid establishment. Once establishment is attained, the majority of root development commonly remains in the upper 30 cm of the soil profile and is most prolific in the organic-mineral soil interface, except in the case of very deep humic layers.

Oxygen

Oxygen, required for root activity, must be absorbed from the soil atmosphere. Seedlings do not move oxygen down from their tops to their roots.

Wet, compacted or finely textured soils do not provide roots with adequate oxygen for optimal growth performance due to reduced pore spaces. Selecting planting spots that are well-aerated with minimal free water, commonly associated with porous organic or organic-mineral soil mixes will optimize the availability of oxygen to the root tips.

Most organisms, including seedlings, die first and most quickly from suffocation (lack of oxygen), secondly from thirst (lack of moisture) and thirdly and most slowly from starvation (lack of nutrients).

Light

Photosynthesis, the process of utilizing light to assist in the conversion of water and nutrients into carbohydrates, is critical to a seedling's successful survival and effective growth. Competing vegetation, often in the form of herbaceous species, reduces light availability. Competing vegetation often grows best on cool, moist, low spots. Selecting seedling microsites that are higher than the surrounding microsites can maximize the amount of light reaching the seedling.

Microsite selection

Good planting behaviour emphasizes the selection of the best microsite that will include all of the above attributes. Utilizing terms such as "Duff" and "LFH" planting creates confusion and often diverts attention away from the truly important microsite selection process by focusing only on one aspect.

Successful reforestation is based on effective initial establishment and growth of tree seedlings. To accomplish that goal requires that we express care and attention to the seedlings' needs throughout all phases of the reforestation process. Constant review of basic biological and physiological plant requirements designed to help recognize sites where seedling growth can best be optimized will ensure more success in our reforestation programs.

Call the planting technique what you will, but for the best growth emphasize the selection of the "Best Microsites".

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AERIAL Fertilizing

by Kevin Brown

Coastal forests of British Columbia are among the most productive in the world. However, shortages of timber are predicted in the near future because of decreased availability of accessible old-growth timber, increased protection for non-timber values, and insufficient supplies of second-growth timber from stands established during the past few decades.

Coastal forest productivity is often limited by nutrient deficiencies. Fertilization can increase wood production per unit of land and per tree by adding limiting nutrients to appropriate species and stands. Its use may therefore increase supplies of second-growth timber in coastal British Columbia. What is currently fertilized and what are some emerging issues and questions relating to fertilization?

Forest fertilization in coastal B.C. has focused, and continues to focus, on Douglas-fir. Research, begun in the 1950s in British Columbia, Washington and Oregon, showed that growth of Douglas-fir responded to fertilization with nitrogen (N), but rarely to additions of other elements. Subsequent studies have clarified what responses can be anticipated. Single-application broadcast fertilization rates of 200-225 kg N ha-1 can increase wood volume by 30+ m^3 per hectare over 10 years in thinned stands and somewhat less in unthinned stands. Growth responses typically last 6 - 10 years and are relatively consistent over a wide range of stand ages. Fertilization with N has the greatest effect on wood production on moderately-productive sites in which the availability of moisture and nutrients other than N and phosphorus (P) are not limiting. Late-rotation (30-50 years) fertilization of Douglas-fir on such sites produces better returns on investment than do other stand-tending treatments, as shown in analyses by Reid Carter (www.wsca.ca/Resources/). Although repeated fertilization boosts growth, most fertilized stands in coastal B.C. are currently fertilized only once prior to harvest.

Over 70 percent of the operational forest fertilization in British Columbia over the past two decades occurred on the coast and most of that in Douglas-fir dominated stands. Still, forest fertilization on BC's coast is relatively uncommon, compared with regions outside the province. For example, about 9000 hectares of Douglas-fir forest are fertilized annually in coastal British Columbia, compared with about 50,000 hectares of coastal Douglas-fir in the Pacific Northwest and 300,000 hectares in the southeastern United States.

On the coast, N is applied almost exclusively by helicopter and as forestry-grade urea (46-0-0). Urea contains more N per unit fertilizer than do other N fertilizers, such as ammonium nitrate (35-0-0) or ammonium sulphate (21-0-0-24). This reduces delivery costs. Urea has better handling properties than ammonium nitrate and has been as effective as other N fertilizers in

increasing growth. In interior British Columbia, fertilization with N alone can cause sulphur deficiencies. Hence, stands are often fertilized with ammonium sulphate. Aerial fertilization costs are typically about $ 300 per hectare.

Urea applied to forests is broadcast onto the soil surface, rather than incorporated into soil, in contrast with agricultural practice. Added N may be lost to the atmosphere through volatilization as ammonia under warm, moist, and breezy conditions. Hence, application is recommended when cool and when significant amounts of precipitation are imminent (typically, November-March). Even then, only 10-30 percent of added N is incorporated into trees. Much of the remainder is immobilized in the soil.

Low-elevation coastal forests of British Columbia are composed mainly of western hemlock and western red cedar, but these are much less frequently fertilized than are Douglas-fir forests. The effects of fertilization have not been studied as much for hemlock, cedar, and other coastal species as for Douglas-fir and their responses to N fertilization have often been considered "unpredictable". However, the SCHIRP studies on northern Vancouver Island (SCHIRP Research Update #2, www.forestry.ubc.ca/schirp) show that fertilization of young (< 10 years old) cedar and hemlock stands with N + P greatly increases growth both on salal-dominated old growth cedar-hemlock (CH) cutovers and on the more productive second-growth hemlock-amabilis fir (HA) cutovers and can be a good investment under certain conditions. This has lead to 10% of coastal forest fertilizing in young hemlock-dominated stands with 225 kg N and 75 kg P per hectare. Fertilization with N and P is more expensive than is fertilization with N alone because of higher fertilizer and delivery costs. Additional research is needed to clarify where P needs to be added to obtain

a growth response to N, how much P needs adding, and how older stands will respond.

Fertilization may not increase tree growth as much as expected if the wrong stands are fertilized, if other site constraints limit response, or if inappropriate nutrients are added at inappropriate rates. Heavy over-fertilization with N can also cause imbalanced nutrition within the tree, perhaps making the tree more susceptible to pathogens such as some needle casts and root rot organisms. Conversely, fertilization can be used to restore balanced nutrition in forests subjected to excessive air pollution such as atmospheric nitrogen deposition. To-date, this has been much more of an issue in forests of heavily populated Europe and the eastern United States than in coastal British Columbia.

Forest fertilization is sometimes perceived to pose a risk to water quality, perhaps because agricultural runoff can be a serious non-point source of water pollutants. Fertilization with urea can cause temporary spikes in streamwater nitrate concentrations, but the effects documented to-date have been small compared to inputs from natural sources. There have also been concerns that heavy metals such as cadmium, found in phosphate fertilizers, might impact forest water quality. However, the risks to water quality are being minimized through the regulation of fertilizer composition, low application rates, the infrequency of forest fertilization with P (compared with agriculture), and use of unfertilized buffers along streams.

Much of the fertilization response data applicable to coastal British Columbia forests has been determined for even-

Silvicultural Investments Offer Few Economic Opportunities to Increase Volume or Value

Footnote

1. Reid Carter analysed the financial return over time for various treatment investments in three major coastal site types in a contract for FRBC. These analyses are amalgamated onto one graph. Whether the investment created value or 'destroyed' value was calculated by deducting FRBC's record of cost for these treatments from the net present value (NPV) of future value gain from the treatment using a 4% discount rate. If the cost of the treatment exceeded the NPV of the treatment, the investment was considered destructive (of the investment) if the cost was less than the NPV the value gain was 'high'. This analysis did not take into account the benefits of off-setting a projected down cycle in wood flow from increasing productivity on one site for a whole forest estate or any other benefits from managing harvest constraints or market shifts.

However, despite the additional financial benefits possibly flowing from forest level analyses, further case studies carried out by Reid Carter have demonstrated that the returns presented on this graph are typically little changed.

aged stands originating after fire or clearcutting, yet there is increasing interest in forest practices that increase the complexity of stand structure. Will variable retention harvesting practices affect stand responses to fertilization? Can fertilization in young even-aged stands be used to accelerate the development of complexity in stand and canopy structure? Few studies to-date have examined how nutrient availability and demand vary under different silvicultural systems.

Recent articles in Canadian Silviculture have discussed how forests in Canada might be managed to enhance carbon sequestration and create carbon credits under the recently signed Kyoto Protocol. If tree growth (and biomass accumulation) is limited by low nutrient availability, then appropriate fertilization might increase carbon sequestration, at least in the short-term. Conversely, increased nutrient availability might increase rates of organic matter decomposition, increasing rates of carbon dioxide loss from soils and offsetting increased carbon sequestration in above-ground biomass. There are also carbon costs associated with applying urea fertilizer, because it is manufactured using natural gas. Forest fertilization may increase carbon sequestration in some stands, but it is unclear how much. Since fertilization is always pre-harvest, it is unclear if most of the added carbon will end up in forest products, which do not qualify under Kyoto. It is also unclear whether shorter rotations associated with (and a desired result of) fertilization are consistent with maximizing carbon sequestration.

Finally, while not forest fertilization per se, in some instances appropriate use of nitrogen-fixing red alder in coastal forests may increase site fertility and reduce the need for synthetic N fertilizers. Long considered an unwanted species in low-elevation coastal forests, alder is now known for its ability to increase soil nitrogen and organic matter contents, its resistance to laminated root rot, and as a source of fast-growing, relatively valuable logs.

In conclusion, forest fertilization of coastal forests generally means fertilizing moderately productive Douglas-fir stands with N one time before harvest. Productivity gains can be significant, but there is considerable potential for further increases in growth with repeated fertilization. Other coastal species are generally not fertilized, but N + P fertilization of young hemlock and cedar stands has resulted in striking growth increases. Well-designed research trials have provided the basis for operational fertilization and are needed to determine how species other than Douglas-fir respond to fertilization. Emerging issues include the role of fertilization in "alternative" silvicultural systems, impacts of forest fertilization on carbon sequestration, and how management of red alder might increase site fertility and growth of associated conifers.

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Vision & Optimism
from the Ninth National Forest Congress

by Dirk Brinkman

Canada's first National Forest Congress in 1906 was chaired by Prime Minister Sir Wilfrid Laurier. The Congress recommended the need for a general forest policy for Canada and extensive planting programs for both harvested forests and marginal farmland.

Canada's ninth National Forest Congress (NFC) in May 2003, four generations later, could only celebrate one of those three recommendations, meeting the need for extensive planting programs for harvested forests. Today's mature silviculture industry promptly reforests all areas harvested with ecologically appropriate species until they are free-growing.

Canada's perspective on general forest policy has also matured. There was consensus that forest policy will always be a work in progress that requires continual adaptation due to our growing knowledge and changing values.

The congress heard the call for planting programs for marginal farm land.

The NFC was the venue for launching the 2003-2008 National Forest Strategy (NFS). On the first day of the Congress, the Sierra Club released a report endorsing the NFS, "The National Forest Strategy provides a valuable opportunity for Canada to articulate a national vision of progressive, ecosystem-based forest management...a national 'Road Map'..."

While they cautioned that to "fulfill existing commitments to complete the network of representative protected areas in each province and territory" requires further pressure to see that governments live up to their commitment to the strategy, the Sierra Club's report expressed cautious optimism.

Canada's NFS was developed by all stakeholders, including industry, government and First Nations. The endorsement of the Sierra Club was an unprecedented benchmark. This was a welcome response for many in the forest industry, some of whom may have felt like they have walked on hot coals for their entire forestry careers during this last generation of conflict.

Avrim Lazar, President of the Forest Products Association, reported that during that generation, the environmental obligations of Canada's forest sector became the most costly in the world. He quoted a global comparison study by W. Henson Moore, his counterpart as president & CEO of the American Forest & Paper Association, in which the Americans found, to their surprise, that the Canadian forest sector also carries the largest tax burden in the world. Despite this, the US sector persists in its lobby to impose punitive trade barriers. The US Treasury Department has also reduced the value of the US Dollar against international currencies, including the Canadian dollar, making it even more difficult to export to the US. In addition to these challenges, world forest commodity prices have been in a steady decline. However, Avrim reported, the Canadian industry continues to restructure to cut costs and is consequently able to take away some of the protectionist and increasingly inefficient US sector's global markets, particularly on the Pacific Rim.

Logs were not the only value debated. Dr. Luc Duchesne, Natural Resources Canada's research expert in Canada's potential forest bio-economy, declared Canada has the potential to tap into a one hundred billion dollar market in bio-products, especially for bio-energy through co-generation and bio-oils from residue. Duchesne quoted a study from Minnesota, suggesting that even hydrogen can be made from wood through fast pyrolysis (BioOil) or through fermentation (ethanol), with one cord of waste wood producing enough hydrogen to power a car for a year.

Combining the bio-economy, which includes pharmaceuticals like taxol and mushrooms, with the traditional forest economy has the potential over the next generation to double the forest economy, completely changing the future of remote resource communities across Canada. It also has the potential to recreate the future of silviculture by creating demand for today's waste products, brush, thinnings, small diameter and poor quality wood. With additional demand for waste products, the tasks of cleaning out fire hazard material from urban interface areas, enhancing stagnant over-dense forest stand growth and reforesting to higher densities where successive selection harvests are scheduled, could all be afforded by increased harvest volumes and value.

Duchesne and other speakers also discussed the emerging carbon markets. Canada's Climate Change Plan depends for one quarter of its reductions, or 44 mega tonnes, on forest related initiatives. 24 mega tonnes (MT) of carbon is scheduled to result from growth due to forest land use changes and 20 MT from growth due to afforestation. Afforestation for carbon sequestration must be on land that has been without trees for over 50 years. This represents the opportunity for Canada to finally meet the goal of the first Forestry Congress, to plant its millions of hectares of marginal farm land. This also represents an opportunity for the silviculture industry to double Canada's reforestation program.

The urgency to act to prevent global warming was underscored by Natural Resource Canada's forest carbon budget scientist, Mike Apps. Recent

confirmations from scientists within the Intergovernmental Panel on Climate Change now project global warming effects to be in the upper end of the former warming range of 1.5° to 5-6°C. This means the projected increases in this century of 5°C to 10°C in the Temperate Forests will be sooner, and will be higher.

Apps described the catastrophic epidemics of pine and spruce bark beetles in northern BC, the Yukon and Alaska as the first effect of the past generation of global warming. Without BC's historic -40°C cold snaps needed to kill off the population in the winter and with the fat, healthy bugs from the warm, wet summers, 2003's flight of pine bark beetles is now projected to destroy over 8 million hectares. We already face forest costs to justify the value of acting on climate change.

Jean Cinq Mars, Wildlife Habitat Canada's President, declared the twenty first Century to be 'the century of biological and ecological services'. As the demand for materials, energy and information now freely flowing from the forest's natural capital begins to exceed the supply, these once free amenities – like clean water, biodiversity, habitat conservation, carbon and recreation – will be monetized. This process will result in user fees for all these values, including recreation fees, water fees and carbon value trading. The independent emerging markets for these ecological amenities will then be able to be infinitely recombined to uniquely fit a restoration design for each landscape.

The week before, Habitat Canada had organized an 'Integrated Landscape' workshop to begin to re-think our forests' abundant values and the impacts of multiple disturbances. He reported that at the Integrated Landscape conference, the importance of developing a process for a cumulative assessment of all current and potential activities and amenities in a forest area was identified, especially for those amenities and/or activities that are in conflict with each other.

The new values emerging in Canada's forest sector – the bio-product market, the multiple ecological markets and the integrated cumulative assessment processes – represent excellent examples of the kinds of challenges that require forest policy in Canada to remain continuously adaptive.

The ability to be adaptive requires a national consensus that includes First Nations peoples. The willingness of all participants in the NFS Strategy to create a strong role for First Nations was also unprecedented at this Forest Congress.

The 'Rights and Participation of Aboriginal Peoples' section of the NFS sets out the objective to "Accommodate aboriginal and treaty rights..." and includes the action to "provide for a fair share of benefits from the use of forest lands and resources."

The moral depth of this need was plumbed at the congress when members heard Treaty #3 Grand Chief Leon Jourdain, from Lac La Croix (Ft. Francis), provide witness to his people's mercury poisoning. As a counsellor seeking to penetrate the source of self-abuse, he recounted an elder's advice that "at the core of his people's identity lies humiliation from the logging...of traditional lands."

The potential for resolving First Nation's rights in the forest during this generation was demonstrated when Grand Chief Ed Schultz of the Council of Yukon First Nations reported on the recent historic joint forest resource management agreement with government and First Nations that had been recently reached for the management of Yukon forest lands.

For those of us who had worked hard to get the forest strategy right – setting the ecosystem based National Forest strategy as the foundation for economic recovery and economic recovery as the engine to pull the recovery of the social sector – the 9th National Forest Congress was a celebration.

Despite global competition, global warming and the devastation of the pine and spruce bark beetles, despite the high costs, countervail duties and declining commodity prices or perhaps because of our common adversity, the forest sector, environmentalists, First Nations, communities and all Canadians share a common vision.

With a common vision, it becomes possible to capture emerging opportunities like combining the bio-economy with the traditional forest sector, and integrating multiple ecological benefits such as carbon with traditional forest products.

In these tough times, I am glad to report, the 9th National Forest Congress was a surprisingly uplifting Congress.

Dirk Brinkman is the editor of Canadian Silviculture Magazine. He is the co-founder and CEO of Brinkman & Associates Reforestation Ltd., Canada's oldest and leading reforestation company. They will plant their 700 millionth tree this year.

Wildfire Management Strategy

by John Betts, WSCA Executive Director

Western Canada needs a wildfire management strategy that goes beyond suppression. Managing fuels and restoring ecosystems would reduce a major threat to our forests and generate a new forestry economy.

Speaking at the U.S. Western Governor's Association Forest Health Summit last June, USDA Chief Forester Dale Bosworth described possibly one of the most significant shifts in U.S. forest policy since the Forest Service came into being in 1905.

"We will continue to fight wildfires when we have to", he said. "But when we can, we need to be proactive on the ground. The fight against wildfire will only be won by controlling the fuels. We have to take the heat out of the forests."

In 1905, with Gifford Pinchot heading the nascent US Forest Service, a series of devastating fire years that decade brought public opinion and government policy around to protecting forests and the landscape from wildfires. Pinchot's conservation program was built primarily around fire suppression.

Now almost a century later a series of devastating fire years has again brought wildfire policy to a conservation threshold. Only this time fire suppression is no longer seen as the prime tool to conserve the forests.

Last year, the U.S. spent $US1.6 billion to fight fires that burned 3 million hectares. Ironically, much of that destruction was fuelled by decades of successful wildfire suppression.

Recognizing this paradox, the Americans have come to the conclusion that they need to reduce the fuel and energy in their forests before they burn. That revelation has come largely from the shock of seeing flame walls 400 feet in height stretching for miles across the landscape.

Already at this writing, 2003 has seen more than 250 homes burnt in New Mexico. Notwithstanding some perennial contrarians in the environmental movement, most reasonable stakeholders are beginning to see advantages to thinning forests, removing the ingrown underbrush and restoring them to a state where fire need not be a devastating event.

Here in Western Canada we should be coming to the same conclusion. But we don't appear to be. For the past few years the U.S./Canada border has seemed to act as a firebreak. In 2000 when Idaho, Washington, and Montana burned, British Columbia and Alberta did escape relatively unscorched. But the same forest types that went up in smoke south of here extend well north of the border along the cordillera and into the Interior. Furthermore, we have managed our forests like the Americans; suppressing wildfire successfully for decades. Our woods are as prone to increasingly severe wildfire as theirs. We just haven't had the ignitions. Our immunity to wildfire is an illusion.

A recent study of 16 million hectares of the B.C. southern Interior, stretching south from 100 Mile House and across from the lee of the Coast Range to the Great Divide, has analyzed the historic natural fire regimes of this region's forests to determine how far these ecosystems have departed from their typical wildfire disturbance patterns. Almost half of the study area is in a moderately to severely departed state meaning fires have skipped at least one or two intervals. When fires don't occur fuel builds up and the results of the study show large areas of the south of the province have a growing fuel hazard on the ground. That hazard will eventually express itself in wildfire behaviour possibly so severe, in some cases, it will destroy ecosystems right down to the bacteria in the soil.

But natural habitat, flora and fauna are not the only things at risk. The same study shows 375,000 hectares of fuel-filled forest are threatening homes and communities built in the interface between settlements and the woods. For instance the city of Nelson and its environs along Kootenay Lake, an area that historically burnt in fire return intervals of between 7 to 30 years, has not seen significant wildfire since the turn of the century. In that community almost $1-billion worth of interface residences are at risk. To calculate the total real estate values at risk between communities from Whistler to Radium would produce figures of tens of billions in just southern British Columbia to say nothing of Alberta and the north.

The US government intends to spend $US12-billion over the next ten years on their national forests reducing the risk of the occurrence of uncontrollable, catastrophic wildfires. In British Columbia, where the operable forests are roughly equal in area to the total U.S. national forests, there is no organized program to manage wildfire through fuel reduction and ecosystem restoration. For example by this spring the Americans had already prescribed burned 400,000 hectares in six months as part of their forest health program. In British Columbia less than 5,000 hectares are prescribed-burned annually.

In Western Canada, we seem to have been granted a grace period when it comes to wildfire. So far we have failed to fill that opportunity with convincing action. Instead there is a growing fatalism among foresters that governments will not act until some catastrophe moves them. From a moral and a practical point that is an unacceptable strategy.

Provincial, federal, and municipal

governments need to collaborate now and create a wildfire strategy that goes beyond that traditional emphasis on suppression and emergency response. It would have to be a proactive strategy built on maintaining ecosystem health as the main priority. Land managers would recognize the importance of natural disturbance patterns and plan accordingly. Communities and landowners would have to regulate and build with respect for the place fire holds in their adjacent forest landscape. A new forestry industry would have to be developed to implement the commercial thinning, brushing, and prescribed burning required to restore forests to a sustainable, resilient threshold. The public would have to be educated to understand beyond some of the simplistic thinking typical of the polarized land use fights in the past.

None of this will go ahead of course without money. But removing the waste from the woods is not all costs. Some operations will be able to pay for themselves in merchantable wood. In other areas we will have to develop technologies and markets to deal with the bio-mass and the small wood. The Americans have made some progress on this already with entrepreneurs stepping into niche markets created just from residential clean-ups. Gale Norton US Secretary Department of the Interior is, among many things, investigating the possibilities of portable co-generation power stations to consume the materials generated from reducing fuels and restoring their beleaguered forests.

Like in the U.S. we will have to match the scale of the problem with our imagination. Some abstract thinking will be required. For instance the very volatility that makes wildfire so destructive (the waxes, terpens and fibres) is a huge potential source of energy. If we extract bio-oils from the accumulated bio-mass we have a new source of energy from our forest.

Even more conceptual are the possibilities of carbon credits and opportunities created from our signing on the Kyoto protocol. It is possible that carbon sequestration could generate revenues that would justify their wise use to prevent huge escapes of carbon through wildfire.

Today there is a groundswell of separate wildfire strategies developing among communities across Western Canada who have recognized the wildfire threat. These independent initiatives are led by a handful of maverick bureaucrats, scientists and innovative community leaders who are supported by an informed public. But they are still very much the minority and although they are resourceful they are not capable of spontaneously generating a program on the scale we need. That must come from the policy makers and politicians from higher levels of government.

These leaders need to first at least signal that they recognize the problem. If they did, they would be surprised at how quickly the resources could be marshalled to develop and implement a wildfire management strategy before things start going up in smoke.

LUSTR CO-OPERATIVE

Stock Handling 101

by Laura Challen, Program Manager LUSTR Cooperative

Careful handling of tree seedlings is a priority in Ontario's silviculture industry. Most forest companies, tree planting contractors and nurseries have internal stock handling guidelines to ensure seedlings are in good health when planted into the field. This spring, LUSTR Co-operative hosted a series of nursery stock handling workshops in North Bay and Thunder Bay, Ontario. More than 110 people gathered to share their experiences and ideas about appropriate stock handling techniques.

Richard Wilson, a Provincial Pathologist, spoke on pathogens affecting tree seedlings. Central to his presentation was the concept of the disease triangle. Essentially, healthy seedlings are more resistant to fungal infection. Seedlings that are stressed due to inappropriate environmental conditions are more prone to infection. By controlling environmental con-ditions such as temperature, humidity and handling, growers and tree planters have a better chance of preventing pathogen infection. His experience shows that temperature is the single most important environmental factor. Many pathogens favour higher temperatures and inappropriate temperatures can stress and weaken seedlings.

Laura Challen, from LUSTR Forest Renewal Co-operative, reviewed the physiology of stress resistance in tree seedlings. Seedlings are biological organisms with seasonal cycles of tolerance to various stresses.. Seedlings are most stress resistant during dormancy, followed by the hardening phase and establishment phase. They are least stress resistant during the rapid shoot growth phase. Stock handlers use the visual cues of these phases to help them manage seedlings appropriately. Dormancy is marked by a strong bud. The establishment phase starts with bud break and tends to last about 10-14 days. Rapid shoot growth is marked by shoot elongation and the hardening phase starts with bud set.

Growers and contractors artificially control the seasonal cycles by controlling environmental factors such as temperature, day length and fertilization. For example, blacking out in the nursery is used to induce bud set and the hardening phase. Cold storage at the nursery and temperature-controlled storage in the field can extend the dormancy, establishment or hardening phases of seedlings. In this way, seedlings are transported and handled when they are most stress resistant and are planted when they are most likely to develop a good root-soil interface at the planting site. Some tree planting contractors use digital data loggers to monitor reefer and box temperatures. Not only can they ensure appropriate temperatures are being maintained, but they have also generated the necessary documentation to monitor their performance.

The timing of thawing and pick up is important because seedlings are most resilient to the stress of transportation and planting prior to bud break and shoot growth. Fortunately, thawing schedules have become more flexible. Growers are now able to thaw seedlings in a matter days, and can adapt to changes in pick up schedule.

A panel of local growers and tree planters discussed issues surrounding boxes and totes. The tree planting contractors were unanimous in their support for standardized shipping systems. The call for standardization would allow the contractors to develop one stacking system for the reefers, quads and other transportation vehicles. Currently, contractors need to adapt all their equipment to suit different boxes or totes.

Most planters prefer hard plastic totes because they stack better, without collapsing and damaging the trees. As well, they are easier to clean up and send back to the nursery. They have a longer life span and can be re-used many times.

Unfortunately, the theft of plastic totes has become a problem, especially in sites close to populated areas and popular fishing sites. In some situations, planters pay a fee for lost totes. Even in remote locations, planting contractors have invested in lock and key storage to avoid the high cost of lost totes. Identification stickers or bar codes are used by some contractors to track individual totes and deter theft. Companies, contractors and growers work each season to establish who will be held responsible for totes lost in different scenarios. In some cases, guidelines were agreed to by all parties at the beginning of the contract. This has made the process simpler.

Planting contractors have the additional challenge of an unskilled portion of their work force each year. Often, contractors lose their skilled planters to provinces where the spring planting season is longer and planters can make more money in a season. Because of this high turnover rate, training is required every year. The possibility of extending the planting window was welcomed by everyone because it may enable them to retain their experienced planters for a longer time frame. Researchers in Ontario are testing techniques to extend the planting season into July.

It was emphasized that planters handled stock well and plant trees well, when their productivity and morale is high. Planters prefer bundled, pre-culled seedlings, because the field environment is an inefficient place to cull seedlings, even when they are trained to recognize the height and root collar requirements of seedlings. In some cases, seedlings are not bundled prior to shipping. When planters have to cull and pack loose seedlings, extra handling is required and productivity time is lost and this can affect morale unless the lost time cost is recognized. In particular, if soft-walled seedlings are not bundled and are cut two ways, they can become a "tossed salad" during field transport. If they are cut only one way, they must be ripped apart by planters, which may be damaging to stock and cause a loss in productivity. To address this issue, a new packing system for soft-walled seedlings has been developed to mitigate these problems and will be tried this year.

The workshops were an excellent forum for open dialogue among stock handlers in Ontario.

The workshops were generously sponsored by the OMNR, Jiffy Products (N.B.) Ltd., Bowater Thunder Bay Woodlands, Heritage Reforestation Inc., Brinkman & Associates Reforestation Ltd. and Valhalla Inn and The Working Forest. Thank you to the many companies donated material for the interactive demonstrations including: PRT Dryden, Pineland Forest Nursery, Jellen Nursery, Hill's Greenhouses, Boreal Nurseries, Cook Lake Nurseries, Hodwitz Enterprises Ltd. La Maison Verte, KBM Forestry Consultants, Broland Enterprises Inc. Northland Reforestation, Haveman Brothers Forestry, Dr. Ed Setliffe, Lakehead University Greenhouses and Arc Industries.

ASSOCIATION DES ENTREPRENEURS DE TRAVAUX SYLVICOLES DU QUEBEC

Les Bouleversements d'un Changement de Gouvernement

par Fabien Simard, ing. f., Directeur général

Le 14 avril dernier, les Québécois ont procédé à l'élection d'un nouveau gouvernement.

Monsieur Jean Charest et son équipe avaient annoncé lors de la campagne électorale leurs intentions et avaient mentionné qu'ils procéderaient à une restructuration du rôle de l'État.

L'industrie de l'aménagement forestier n'a pas tardé à percevoir les ondes de choc de ces changements. En effet, le 17 juin dernier, le ministre des Ressources naturelles a annoncé la coupure du seul programme efficace pour le recrutement et la formation de la main-d'œuvre en sylviculture, soit le retrait complet des projets SDMOE (Soutien au développement de la main-d'œuvre en entreprise).

Les projets SDMOE permettaient à des gens sans expérience dans le milieu sylvicole d'obtenir une formation complète répartie sur plusieurs semaines. La formation était donnée directement par des entreprises exécutant des travaux sylvicoles. Les apprentis avaient donc, dès le début, un portrait réaliste du métier et surtout une expérience concrète sur le terrain. De plus, les projets SDMOE contribuaient financièrement à l'achat des outils nécessaires pour ce travail, considérant qu'il était quasi impossible pour tout nouveau venu dans le domaine, de pouvoir accéder à tout cet équipement par ses propres moyens.

Enfin, il a même été démontré qu'un travailleur qui avait suivi cette formation, avait acquis les connaissances équivalentes à un travailleur ayant 3 ans d'expérience sans formation.

Les membres de l'AETSQ ont formé à eux seuls, sans compter les autres associations, plus de 125 travailleurs, et ce, grâce à l'existence des projets SDMOE des deux dernières années. Sans oublier aussi que la très grande majorité de ces nouveaux travailleurs étaient auparavant des gens sans emploi ou vivant de l'Aide Sociale.

Vous comprendrez donc notre grand étonnement quant au choix de notre nouveau ministre des Ressources naturelles de non seulement éliminer de tels projets mais en plus de les retirer un an plus tôt que prévu initialement. Considérant aussi que notre industrie éprouve une grande difficulté de recrutement et de rétention de sa main-d'œuvre, nous ne comprenons tout simplement pas ce qui a pu justifier une telle coupure.

Les entrepreneurs comprennent mal la priorité accordée par le gouvernement à certains programmes au détriment d'un autre qui répond à une problématique criante du secteur qui est la pénurie de main-d'œuvre en forêt. Quand on constate que le ministre a privilégié de ne pas réduire l'enveloppe monétaire d'un programme de création d'emploi. Créer de l'emploi ! Oui c'est bien beau mais pour qui ? Pour des travailleurs qu'on ne recrute pas faute du manque de candidats formés et expérimentés.

On comprend très mal pourquoi le gouvernement a drastiquement coupé dans le seul programme qui permettait d'intégrer les jeunes dans les régions ressources et ainsi éviter l'exode des jeunes vers les grandes villes. Surtout après que notre nouveau premier ministre ait signifié lors de la campagne électorale sa préoccupation et son engagement à maintenir et à investir davantage dans les régions.

Certains croirons que notre industrie est outrée croyant qu'elle aurait préféré être épargnée de toutes coupures. Détrompez-vous! Comme la plupart des secteurs économiques qui ont eu l'annonce d'une réduction lors du dernier budget, nous sommes d'accord pour que certaines coupures soient faites mais, par contre, nous sommes en total désaccord pour être amputé d'un outil indispensable qui met en péril le développement de notre industrie ainsi que le rendement soutenu des forêts québécoises.

La conséquence de cette pénurie de travailleurs depuis quelques années fait en sorte que nous ne pouvons répondre à la demande de la réalisation des travaux sylvicoles prévue à la planification annuelle. Il serait donc important de se rappeler que se sont ces mêmes travaux qui nous permettent de maintenir la possibilité forestière du Québec.

Disruptions Caused by a Change of Government

by Fabien Simard, RPF, Executive Director

Last April 14, Quebeckers proceeded to elect a new government. Mr. Jean Charest and his team had announced their intentions during the election campaign and had indicated that they would undertake a restructuring of the role of the State.

The forestry management industry was not long in feeling the shock waves produced by these changes. In fact, on June 17, the Minister of Natural Resources announced the termination of the only effective program for recruiting and training forestry manpower by cancelling all SDMOE projects.(Support for on-the-job manpower training).

The SDMOE projects allowed persons without experience in a forestry setting to receive a thorough training over a period of several weeks. This instruction was provided directly by companies carrying out forestry work. The learners thus had, from the beginning, a realistic picture of the profession and, above all, practical hands-on experience. In addition, the SDMOE projects helped finance the purchase of the necessary tools for the work, in view of the fact that it was almost impossible for a newcomer in the field to be able to obtain all this equipment by his own efforts.

Finally, it has even been proven that a worker who had undergone this training had acquired skills equivalent to those of an untrained worker with three years' experience.

The members of the AETSQ (Association of Silviculture entrepreneurs of Québec) have themselves, without including the contribution of other associations, trained more than 125 workers, thanks to the SDMOE projects of the past two years. Let us not forget also, that the great majority of these newly trained workers were previously either unemployed or living on welfare.

You will therefore understand our great astonishment at the decision of our new Minister of Natural Resources, not only to eliminate such projects, but to cancel them a year earlier than was initially planned. In the light of the fact that our industry is having great difficulty in recruiting and retaining its labour force, we are simply unable to understand what could have justified such a cut.

Forestry contractors have difficulty in understanding why the government is giving priority to certain other programs at the expense of one that answers a crying need, namely the shortage of forestry workers. We know that the Minister has boasted of not reducing the budgetary envelope of job-creation programs; job creation is a high-sounding term, but for whom? For workers who can not be hired because of a lack of trained and experienced applicants.

It is hard to understand why the government has made drastic cuts in the only program that allowed young people to become integrated into their own resource regions, thus avoiding the migration of youth towards the big cities. This is particularly baffling after the new premier proclaimed, during the election campaign, his concern for the rural areas and promised to increase investment in the regions.

Some critics may think that our industry is naïve to have imagined that it could be spared all cuts. Not at all! Like most of the economic sectors that received notice of reductions in the last budget, we agree with certain cuts being made, but on the other hand we totally disagree with the amputation of an indispensable tool that imperils the growth of our industry as well as the sustained yield of Quebec's forests.

The continued existence of this shortage of workers over the past few years makes it unlikely that we can meet the demand for increased forestry activity proposed in the annual plan. It is important to remember that it is this same activity that allows us to maintain Quebec's forestry potential.

PRINCE EDWARD ISLAND

FOREST IMPROVEMENT ASSOCIATION

by Wanson Hemphill, Manager

Summer is here on PEI with the sand, surf, golf, heat and biting insects.

Wood Markets have improved slightly but lumber is still at low prices at retail stores. Recent softwood negotiations have caused some concerns in the Maritimes over the potential negotiated loss of our valued exemption status from countervail duties with a Canadian single duty.

The 2000 PEI State of the Forest Report has finally been released. At first glance, it seems there is lots of softwood remaining over the next 10-15 years with 59% of the softwood between 31 and 60 years of age. However, the Department of Agriculture & Forestry has graphs showing a rapid decline in 5 years. Forestry stakeholders are still trying to get more inventory data information to put together an accurate picture of PEI forest resources.

A 2002 PEI Woodlot Owner Survey by UNB and CFS shows some interesting information about PEI's 16,641 forest owners. For example, 73% age 45 and older, 26% are retired and 49% earn more that $40,000 annually. 14.8% of owners intent to never harvest forest wood. 74% are not aware of woodlot programs to assist owners.

PEI forest owners and industry are very interested in plans for a new LVL mill in Miramichi, NB which would buy poplar logs at good prices. Poplar (trembling and largetooth aspen) grow very fast on PEI but most large white logs go to make OSB at breakeven prices, leaving little or nothing for owner stumpage. Eastern Larch also grows fast here but we have a hard time selling much of this beautiful, decay-resistant wood.

Rising insurance costs are causing lots of concerns for the forest industry. Maritime governments have now got involved in limiting claim settlement amounts for auto insurance which may help reduce overall costs. Other strategies include pressure washing often, checking auto extinguisher systems, smoking limits, water on site, fuel storage and moving precautions and forming buying groups.

Addendum to Preventing Treeplanting Injuries

The article "Preventing Tree-Planting Injuries" which appeared in the Spring issue of Canadian Silviculture was produced from material prepared by Dr. Delia Roberts, who would like to add, "One must bear in mind that the recommendations are based upon data collected during only two field studies, and that they were subject to all the vagarities of a planting operation. There are big differences between different planting operations, and the recommendations may not be universally applicable. Further studies are needed before we have a conclusive answer as to what the best strategies for planters really are."

"Furthermore, the role of Weyerhaeuser Company Limited - Forestlands Division needs to be acknowledged," adds Roberts. "Without their support of industry research none of this work could have taken place. Weyerhaeuser provides financial support for FRIAA and FERIC, the two organizations that funded the tree-planting studies." Delia emphasizes that anyone wishing further information should contact her directly at Selkirk College: droberts@selkirk.bc.ca (250) 365-7292.

NOVA SCOTIA

SILVICULTURE CONTRACTORS ASSOCIATION

by Allen O'Brien, President

As incoming President of the Nova Scotia Silviculture Contractors Association (NSSCA), I feel it is my responsibility to comment on the dire situation facing most, if not all contractors in this province. In the past ten years, contractors working on private woodlots have not seen an increase in rates paid for applicable treatments, and most have been cut by registered buyers,eg. sawmills and pulp mills.

Government legislation enacted in 1999 requires registered buyers to amass a minimum number of credits per hectare based on fibre received from private land. Provincial Department of Natural Resources (DNR) regulations require increased technical services be attached to completed work (GPS files, forms, post treatment assessments, landowner interactions). The registered buyers receive a ten percent allowance for administrative costs on all work necessary to comply with provincial regulations. The contractor, however, who is ultimately responsible for carrying out these technical services, is not compensated for any of the costs incurred.

The number of qualified contractors in the province is declining, as many have converted to strictly harvesting operations. When the credit crunch comes in 2004, the registered buyers will have only themselves to blame. The problems created by their short term thinking regarding unilateral policies and pricing will become glaringly apparent. I often hear representatives from the registered buyers in the province commenting that there are not enough qualified contractors to complete the work. The onus is on them to reexamine their policies and acknowledge their role in this situation.

On a positive note, the executive of the NSSCA is in the process of developing a web site which will feature information and assistance for private woodlot owners and contractors. We are aiming for a September 1, 2003 launch!

Wild Tree Seed COLLECTION

by Laughlan Glen

INTRODUCTION

Two categories of seed are used to grow seedlings for reforestation in Canada. Wild seed, obtained from the cones of trees growing in natural forests and "improved" seed, from the cones of orchard trees that have undergone a selection process based on inherited features that forest scientists believe to be beneficial for commercial forestry.

Cone collection planning, methods and equipment vary considerably between the two types. This article discusses the strategies and methods presently used to harvest wild stand collections.

CONE AND SEED BIOLOGY

DEVELOPMENT AND MATURATION

The female reproductive buds (which eventually form cones) produced during any particular year are usually ready for picking in the fall of the following year. Some species require an extra year before seed maturation.

PERIODICITY

Periodicity refers to the year-to-year variation in cone production for the various tree species in different locations.

This periodicity is the result of many unknown and unmanageable environmental factors interacting to determine whether reproductive or vegetative buds will form each spring. Then, even in years when many reproductive buds are produced, the weather, insects, diseases and animals will determine whether the crop can be economically harvested. As a result, collectible cone crops occur irregularly.

PLANNING

As with all commodities sold, a need or anticipated need for the product is essential to the success of a company that collects and sells wild tree seed. Apart from periodicity there are a number of unique factors that combine to make this a high-risk business. Good planning together with a high tolerance for risk are essential to succeed in making wild stand tree seed collections a profitable enterprise.

Assessment of Need

Seed for the reforestation of disturbed areas is usually collected in advance of logging and must be of the required species from the correct provenance[1]. Due to crop periodicity the seed may have to be collected and stored years in advance of anticipated need.

Established seed orchards produce cone crops more frequently than wild stands and new seed orchards are continually being established. Their production must be regularly monitored to ensure that redundant wild seed is not collected, as seed from the orchards is preferred or required by law for crop establishment. The equivalent wild seed should not be collected unless markets are available.

Cone and Seed Evaluation

Cones and seeds are regularly evaluated to determine which crops are worth picking and where and when to pick (maturity).

Five cones per tree from six trees taken from the appropriate tree-crown section constitute a reliable sample. Minimum numbers of filled seed per cone, based on a slice of the cone is the most important indicator of seed potential. The presence or absence of insects and disease must also be taken into consideration as these may reduce the economic viability of an otherwise collectible crop.

Economics

The economic feasibility of the collection must be calculated once the

need, quality and quantity of the seed are assured. Seed quality and quantity are based on the various crop surveys done from the ground or air prior to collection.

ORGANIZATION

Once suitable stands with good cone crops are identified, preparation for the collection is made, well in advance of the actual cone harvest. This includes determination of the best collection method, labour availability, interim cone storage, permits, landowner consent and materials such as sacks, labels, safety equipment and helicopter fuel, if needed.

Collection Methods

The method used for a particular collection is determined by stand accessibility, the number of cones required, size and distribution of the crop, tree size, stand composition and species characteristics. These characteristics include location of cones on the trees, cone persistence on the branches, cone stability and picking "window" – how much time to pick the crop.

The following methods are commonly used:

Climbing – suitable for most tree types, shapes and sizes. Efficient for collections less than 200 hl and distances to access roads under 400 m. Good for selection-work as the best phenotypes[2] can be selected. It is non-destructive and generally the most efficient way to collect cones from trees less than 15 m tall with live branches near ground level. If the cones are small, it is more efficient to cut the branches and pick the cones off on the ground.

Climbers should start at the top of the tree, work down and not go up beyond an 8cm-stem diameter.

Requires lean, fit, agile people with good climbing gear and picking ability.

Felling – this is a fairly common method of collection and when co-ordinated with logging can become very economical. If possible, the trees should be felled in a manner that allows cones to be picked easily from the crowns and quickly transported to roadside for pickup.

Branch de-coning – a method primarily used to remove serotinous cones from branches in conjunction with harvesting. It works best in winter when the branches are frozen. The logging slash is fed into a machine that then separates the cones from branches, twigs and needles. Close co-operation is essential between the logging and collection agencies.

Helicopters – Aerial cone collections must be well planned to ensure success. It is imperative that an experienced pilot is guaranteed for the operation as the volume of cones collected from a stand can vary considerably depending on pilot ability. Arrangements for the provision of fuel must be made and the fuel transported to a convenient location.

There are basically three methods of helicopter collection: raking, shearing and clipping. The method employed depends primarily on tree-crown shape, forest type and profile, road access to the site and collection size. The helicopter model selected depends on collection method and the weight and efficiency of the equipment[3].

Raking – a cone-shaped apparatus fitted with rows of raking tynes and suspended beneath a helicopter is dropped over the tops of cone-laden trees (see Figure 1). As the cone rake is pulled up, the tynes scrape cones off the branches into the rake. The cones are transported to a cleared site where the rake is emptied and the cones stripped from branches by pickers and sorted into sacks for transportation. Although relatively costly, it can be very effective for large wide-crowned species

Figure 1: Raking fir trees.

scattered throughout the stand with cones concentrated at the top.

The pilot selects the crop trees but should be well instructed regarding crop requirements. The dumping site(s) should be large and centrally located. The rake must be properly maintained and the ground crew members assigned specific duties as each load is emptied. The crop quality of each turn is monitored and necessary information relayed to the pilot.

Shearing – this is usually used to harvest cones from narrow-crowned tree species (See Figure 2). The top of the tree is severed and transported in the shear, beneath the helicopter to a transport truck or dumping site.

Clipping – a clipper operator accompanies the pilot and selects the trees to clip. The helicopter hovers beside the tree while the top is lopped and pulled into a modified cabin space. This is expensive and may be considered for remote collection sites with limited access and small collection volumes. A heavy, high quality crop is usually required to justify the costs. Used on large mature trees with a cone concentration at the top. A competent pilot and clipper-operator are essential.

Shooting – this is used primarily for tree improvement selections but it is also practical for collections less than 5 hectolitres. A 30-30-calibre rifle equipped with telescopic sights together with a patient, experienced rifleman is essential. Flat shots (small angle) are best. This method works well if the cones are concentrated at the tops of the trees.

Squirrel caches – although good quality, inexpensive seed may be obtained, it is the most maligned method of collection. Avoid collections in poor quality stands and do not take cones from deep in the cache as they may be infected with Calascypha fulgens, a seed borne fungi.

HANDLING AND INTERIM STORAGE

Cones are usually transported in jute sacks tied securely at the top while leaving sufficient space for expansion during interim storage. The space required varies for each

Figure 2: The tree is severed and transported in the shear.

cone species. Every sack must be appropriately marked with a tag that records all information relevant to the collection as required by the appropriate administrative authorities.

Handling

Handling and storage of cones after picking can have a significant affect on seed quality. As the cones dry, they expand and generate heat that may damage the seeds. Whenever possible, avoid picking in wet weather. If the sacks become wet during collection the cones should be transferred into dry sacks to aid the drying process. However, heating by direct sunlight must be avoided. The filled sacks should be stored in the shade during picking and moved to interim storage daily. At northern latitudes, very low temperatures can also damage the seed within wet cones.

Storage

Immediately after picking, cones start to "after-ripen" or "cure". This is apparently an integral process perhaps necessary to ensure the consistency of dormancy within the seeds. The correct environment during this period is essential to seed quality.

Interim storage facilities are semi-permanent or alternate structures where cones can be safely stored to "after-ripen" before being sent to a seed extraction plant. These should provide adequate cover and ventilation with either circulating or extraction fans installed to aid the natural drying process if possible. Open sheds, carports and barns are examples of such structures.

Transport

Cones that have undergone a period of "curing" in interim storage can be shipped on flat decks or in closed trailers. Fresh cones should not be placed in closed trailers because of the possibility of seed damage from heat generation. Cone sacks should always have pallets inserted between every second layer of sacks to promote good ventilation.

Cone sacks shipped on flat decks can be secured using cargo nets or tarps if reasonably "cured".

The driver should understand the fragility of the cargo and the importance of both product ventilation and speedy, direct delivery to the destination.

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Footnotes

1 Provenance is the geographical area (latitude, longitude and elevation) and environment to which trees are native and within which their genetic makeup has evolved through natural selection.
2 Observable characteristics determined by genetics and the environment.
3 Detailed information on helicopters and equipment may be found in British Columbia Ministry of Forests publication – A Guide to Aerial Cone Collection Equipment and Techniques in British Columbia, 1990 and the BC Tree Seed Dealers Association booklet – A Field Guide to Collecting Cones of BC Conifers, 1996.

BC Moves to *Integrated Pest Management*

by Margaret Eckenfelder

In May of this year, the government of British Columbia introduced the Integrated Pest Management Act, initiating a new way of doing business for the Ministry of Water, Land and Air Protection, and a new way of administering pesticides in British Columbia. The new Act reflects the cumulative experience of staff that has served the ministry for many years, the input from a number of stakeholder groups, and modern, accepted best practices in the field of pest management.

Since the late 1970s, British Columbia has regulated pesticide use through a permit process. The permit system approved pesticide uses on a case-by-case basis and in doing so it approved them in isolation of broader management practices or alternatives. In addition, the permit process required that proponents for pesticide use demonstrate the need for pesticides to regulatory officials as well as to the public. The process also left individual pesticide uses open for appeals.

The evolution of best practices, together with science and a desire to modernise and improve the process for regulation, meant that the permit process had to change. In 1998, the ministry began to allow Pest Management Plans (PMPs) to be submitted as an alternative to permits. The emergence of these plans by the ministry coincided with the acceptance of a new and comprehensive decision-making process and technology used to manage and prevent pest problems. This process is known as Integrated Pest Management or IPM.

Today in B.C., IPM is a practice used by a broad range of stakeholders including industry organizations. This acceptance, as well as the need to formalize a new regulatory structure, laid the foundation for the province's new Integrated Pest Management Act. Under the Act, the use of Integrated Pest Management will apply to pesticide use on all public land and on private land used for forestry, public utilities, transportation and pipelines.

IPM may be new terminology to some vegetation managers but it is a concept already in use by many forest professionals. IPM must include but is not limited to the following elements:

- planning and managing ecosystems to prevent organisms from becoming pests;
- identifying potential pest problems;
- monitoring populations of pests and beneficial organisms, pest damage and environmental conditions;
- using injury thresholds in making treatment decisions;
- reducing pest populations to acceptable levels using strategies that may include a combination of biological, physical, cultural, mechanical, behavioural and chemical controls;
- evaluating the effectiveness of treatments.

Using IPM as a comprehensive process provides an understanding of the issues and needs involved in each situation as well as a complete understanding of the solutions required. The value and benefits of this approach are many and they provide ample reason for the province to encourage its use.

Integrated Pest Management within a Pest Management Plan, and vegetation management in a Forest Stewardship Plan, both address forest values like fish and wildlife habitat and water quality. Both allow flexibility to address unique circumstances of a specific plan area as long as the results are consistent with government standards.

The value of Integrated Pest Management and its acceptance as a best practice have meant that the ministry, through the new Act, now looks to the use of Pest Management Plans as a new and better way of regulating pesticide use in British Columbia. PMPs achieve several things:

- PMPs promote Integrated Pest Management and ensure that pesticides are used in the context of an IPM program.
- PMPs reduce the administrative and technical burden of the permitting system by approving responsible pesticide use over wider areas for longer periods of time.
- PMPs assure regulators that pesticide use is planned according to standards that protect the environment and human health.
- PMPs maintain public confidence in responsible pesticide use in an open planning process.

PMPs provide documentation of an Integrated Pest Management program and the use of pesticides in that program. Each of the components of Integrated Pest Management – prevention, identification, monitoring, injury thresholds, treatment strategies, and evaluation – are required in a Pest Management Plan, as well the specific methods of handling, preparing, mixing and applying pesticides within IPM. Public input must also be sought during the development of a PMP.

Currently, PMPs require approvals that are valid for longer periods of time and over wider areas of land than site specific individual pesticide use permits. Under the new Integrated Pest Management Act, PMPs will be required to be prepared according to legislated standards and may be implemented by a notice to the Ministry of Water, Land and Air Protection without requiring an approval.

Under the Act, where PMPs incorporating IPM are already in place, there will be no change in the methods used to control pests. For future PMPs, treatment methods will likely be the same but their use must fit within the context of IPM and comply with government standards. All standards that will apply under the act will be developed through stakeholder consultation. This is expected to take place over the next several months.

IPM is a logical part of vegetation management and is already practiced by many forest and vegetation managers. The government is not dictating silviculture practice; rather, the legislation requires open planning and documentation to show the use of IPM.

Comprehensive and well-timed pest control can reduce the potential for more drastic, resource draining measures if pests remain unchecked. Pest Management Plans prepared according to standards ensure the vegetation manager that the correct tools are available for use at the appropriate time, without the delay of an approval process or a possible appeal.

Standards for pesticide use in forestry will be developed with input from foresters, silviculturists, pest management experts, representatives from the Ministry of Forests, other agencies and the public. Pest Management Plans will be prepared and pesticides applied according to these standards that apply, where possible, province-wide. This will allow for easier planning, more certainty, fewer appeals, and less administration.

In many areas, IPM provides an opportunity to manage pests in a thorough manner that allows proactive and pre-emptive action while at the same time demonstrating environmental protection and responsible pesticide use. It calls for the consideration of alternatives to pesticides, and it could potentially lead to a reduction in the pesticides we use. This approach has value for silviculturalists and backyard green thumbs alike. It is the promise of this approach that is behind the B.C. government's support for Integrated Pest Management.

Margaret Eckenfelder is Assistant Deputy Minister, Environmental Protection Division for the BC Ministry of Water, Land and Air Protection.

West Nile Virus Cause for Awareness not Alarm

by John Murray

From spring to autumn, insects and dirt are inevitable elements of alot of forestry work, especially cut-and-skid logging and silviculture. In addition to the annoyance and discomfort they can create for outdoor workers, bugs and soil can transmit potentially serious diseases to humans.

Media attention in recent months has focused on West Nile virus, an illness carried by birds and named after the region of Africa where it appeared in 1937. The virus is spread to humans by the bite of a mosquito that has previously bitten an infected bird. The virus cannot be spread from person to person or from a bird to a human.

West Nile virus was first detected in North America in 1999. Only one death in Ontario has been attributed directly to it, but 17 others who tested positive for it have since died and 387 others have become ill over the past year. So far, the outbreak has been confined mainly to cities in Southern Ontario.

The major transmitter of West Nile virus is the northern house mosquito, which lives mainly in urban areas, breeding in small stagnant pools or collections of water around homes. The northern house mosquito does not tend to breed in natural wetland areas such as marshes and swamps, and the mosquitoes that do breed in such areas have little or no potential for carrying the virus.

For silviculture workers and cut-and-skid loggers, the usual precautions against insect bites provide adequate protection from West Nile virus, according to Lyle Wiebe, Environmental/ Occupational Health and Safety Professional with the Northwestern Health Unit based in Kenora.

"First of all, the bird has to carry the virus, then the mosquito has to bite the bird, then the mosquito has to come back and bite the human. Given the life cycle of the mosquito and the low risk of infectivity of the virus after the mosquito bites you, the general risk is low," Wiebe says.

Most people who are infected with the West Nile virus develop no illness whatsoever. An estimated 20% of infected persons develop mild symptoms such as fever, headache, body aches and swollen lymph glands three to 14 days after the initial infection. Less than 1% of infected persons develop the severe and potentially life-threatening form of the disease.

Prevention of West Nile virus

- The northern house mosquito bites mainly at dawn and in the evening. Outdoor work at those times should be restricted as much as possible.
- Wear a hat, long-sleeve shirt, pants, gloves, socks and appropriate footwear. A bug jacket and/or bug hat provide maximum protection.
- Apply insect repellent with 20% to 30% DEET content to any exposed skin or to the outer surface of clothing. Keep repellent away from eyes, open wounds and sunburnt skin. Re-apply only as necessary and according to label directions.
- To reduce mosquito breeding, remove all unnecessary water containers such as old tires, large cans and bottles from the work area. Ditches and other drainage facilities should be kept clear of obstructions to eliminate standing water.

John Murray is with the Ontario Forestry Safe Workplace Association www.ofswa.on.ca

Scientists Wrap Living Cells in Bubbles

by Lynda Chambers

Scientists at a Natural Resources Canada research lab have come up with a faster, cheaper and more reliable way to formulate safe biocontrol agents.

Instead of having to use cumbersome equipment and toxic solvents, Dr. Richard Winder has been able to successfully suspend large numbers of living cells in tiny microscopic beads of gelatin. The process takes about five minutes and uses a simple and harmless solvent.

"This breakthrough is just what was needed for the larger-scale application of bio-herbicides," says Winder, whose innovative research at the Canadian Forest Service's Pacific Forestry Centre was done in partnership with Dr. Jeffrey Wheeler of Surrey-based Prometheus Enterprises Inc.

Biological herbicides do not pose the same risk to the environment and people's health as chemical herbicides. Instead, targeted weeds are killed by naturally occurring bacteria and fungi that are noxious only to the unwanted vegetation and not nearby soil or water.

"Biological control of forest weeds is poised to become an essential component of forest management practices," says Winder.

No wonder, with competing vegetation capable of reducing the growth and survival of thousands of new trees in a regenerating forest by up to 100 per cent! And that's an impact felt not only by the forest industry. Hikers, birdwatchers and picnickers also suffer when seedlings are suppressed by weeds.

While research scientists at the Pacific Forestry Centre have over the years found many types of local and common fungi that would make excellent weed control agents, the problem has always been producing these biological controls in a form that could be widely and economically sprayed, sprinkled or dusted using existing equipment.

"Now we know the chemistry necessary to efficiently and simply encapsulate the biological control agent without harming it," explains Winder, adding that a U.S. patent has been issued on the novel technique and a Canadian patent application has been submitted.