CANADIAN
SILVICULTURE
FEBRUARY 2008

GETTING TREE PLANTING FIT

- Tree Improvement
- Tree Seed Centres
- Inexpensive Regeneration

PM40026059

Accelerate performance.
Accelerate productivity.

MOTOTRBO™

Professional Digital Two-Way Radio System

The next generation professional two-way radio communucations solution is here, with more performance, productivity, and value. MOTOTRBO brings you enhanced voice and data communications with powerful data applications such as MOTOTRBO Text Messaging Services and Location Services. And MOTOTRBO's ability to operate in both analog and digital modes enables a smooth, planned migration. All in a complete system of portable and mobile radios, repeaters and accessories.
Call today and discover how MOTOTRBO can accelerate performance and productivity for your operation.

MOTOROLA
Authorized Two-Way Radio Dealer

Acces Communications
5591 Paré Street
Montreal PQ H4P 1P7
514-735-2424
Toll Free 866-735-2424

BK Two Way Radio
Prince George, BC 250-562-4856
Quesnel, BC 250-992-9007
Toll Free 877-898-4856

CP Electronics
298 North Second Avenue
Williams Lake BC V2G 1Z8
250-392-5583
Toll Free 800-734-7373

GL Mobile Communications
3-243 South Industrial Drive
Prince Albert, SK S6V 7L7
306-922-1170

Glentel Inc.
National Office
Toll Free 800-376-1144

Omega Communications Ltd.
Kelowna, BC 888-860-8016
Penticton, BC 888-479-7272
Kamloops, BC 888-868-1352

Contents

CANADIAN SILVICULTURE

Cover Story

26 Getting Tree Planting Fit

As many tree planters have learned, there is fit, and then there is tree planting fit. The reality for most is that a regular fitness program won't necessarily get you ready for the type of stress and physical output required by a summer on the cut block.

Features

5 Forests for Tomorrow

6 Ontario Sustainable Forest Tenures Have Conservation Benefits

10 Tree Improvement in a Changing Climate

12 Tree Seed Centres

22 Inexpensive Regeneration of Acadian Forests

30 Faller Certification Begins New Stage

Publisher Joyce Hayne
Designer Krysta Furioso
Account Manager Johannis Breyten
Editor Dirk Brinkman
Contributing Writers Brian T. Barber, John Betts, Audrey Harvey, Mike Hutchinson, John McClamon, John A. Muir, Steve Mueller, William F. Murphy, Heather Rooke, Peter Salonius, Warren Warrtig

Canadian Silviculture is published four times a year by EMC Executive Marketing Consultants Inc., 6058 187A Street, Surrey, BC V3S 7R6.
Phone 604-574-4577 Fax 604-574-2196
Email silviculture@emcmarketing.com
www.canadiansilviculture.com

Subscription rates: 4 issues per year - $30.00 & GST

PUBLICATIONS MAIL AGREEMENT NO. 40026059
RETURN UNDELIVERABLE CANADIAN ADDRESSES TO
CIRCULATION DEPT EMC PUBLICATIONS
6058 187A ST
SURREY BC V3S 7R6
email: info@emcmarketing.com

Columns

4 Editorial

16 WSCA Report

17 Ontario Report

18 Quebec Report

20 Nova Scotia Report

21 Forest Health

Editorial

by Dirk Brinkman

Reforesting Climate Disturbances Part II

The first major public climate disturbance reforestation program in Canada is BC's Forests for Tomorrow (reported on page 5). An optimist may read $53 million (20,000 ha/year) for 20 years as a one billion dollar commitment, but a pessimist would see that 2008's commitment of $40 million is less than half the $93 million projected in 2005 for 2008. Even the optimist's one billion over 20 years has dwarf standing in the global pantheon of reversing deforestation. At the Bali Climate Conference, Norway committed over half a billion dollars a year to halting tropical deforestation in order to use the credits to become carbon neutral. With a climate action framework, BC's public climate disturbance expenditure program might grow into a commitment such as Norway's. Program area dollars might also stretch, if the private sector could innovate its delivery.

The challenge of restoring large scale ecological degradation is not new. BC's MPB catastrophic devastation is unique in that 78% (nearly a billion m^3) of BC's pine will disappear in less than a generation. Australia cleared 250 million hectares for agriculture in a dozen generations, and as a result of overgrazing and more recently urban development, devastated ecosystems and critical habitats. To stretch the state's limited budget for restoring endangered species habitat, New South Wales Ministry of Environment and Climate Change recently launched a Biodiveristy Banking and Offsets Scheme www.environment.nsw.gov.au/threatspec/biobankscheme.htm. A similar but smaller restoration scheme in the state of Victoria, inviting private landowners and environmental entrepreneurs to innovate habitat in restoration partnerships, increased biodiversity benefits seven times over results from the same dollars expended through government prescribed and budgeted programs.

Is there a similar opportunity here in BC? More than 500 wetland mitigation banks in the US invested billions of dollars in restoration through innovative environmental entrepreneurs. Wetland banking diversified into streamside banking, conservation banking, grassland banking, and even fish banking. With the Western Climate Initiative, restoration has also been funded by carbon credits in California and Oregon. With Australia adapting market innovation into a publicly funded British constitutional system, it is time to see these concepts in Canada.

BC has also signed onto Oregon and California's Western Climate Initiative. Carbon goals could stimulate innovation through a Climate Disturbance Restoration Bank and secure additional funding. Making Forests for Tomorrow (FFT) a carbon investment trust may secure long term funding. As BC's 35th reforestation fund in as many years, FFT requires protection from economic downturns, which are perhaps as inevitable as global warming.

The Minister of Forest & Range has modified BC's "deforestation to reforestation" ratio indicator reducing the area deforested to areas "suitable for FFT planting". More fully displaying the magnitude of the staggering effect MPB is having on the forest and its dependant communities may help secure federal government co-funding. It is irrefutable that MPB is a climate catastrophe outside of BC's management control and federal co-funding of the restoration is appropriate. More important still is a new federal climate action framework for the forests so that all programs can harness their future climate benefits.

Local community mayors such as Christ'l Roshart of Lillooet are demanding governments mobilize now and not wait 20 years. Delays clearly risk increasing the public burden because as more standing dead decays the unsalvageable area will increase. Delaying site preparation also increases the risk of huge wildfires in MPB stands.

It is scale and uncertainty that are MPB's biggest problems. Solving these big problems will be easier within national and provincial carbon market trading mechanisms and climate disturbance banking trusts, which can harness environmental entrepreneurs to stretch limited dollars. The seven billion dollar program announced by the small country of Norway is possible because it is a part of the robust international peer review and bioethics of the Bali Climate Action Plan. Canada cannot continue, as it did at Bali, obstructing international climate negotiations, when in doing so, it obstructs solutions to urgent problems at home like MPB.

While governments have to proceed with caution, the pine beetle epidemic knows no such constraints. BC is to be applauded for its commitment to joining the rearguard action of the Western Climate Initiative of Oregon, California, and other US states. Now let's take the next bold step and harness that climate framework to launch a climate restoration initiative that matches MPB's epic scale.

Forests for Tomorrow

by John McClarnon

The Forests for Tomorrow (FFT) program is designed to reforest both mountain pine beetle and wildfire areas in BC that cannot be reforested without non-recoverable losses. Areas salvaged for timber or bioenergy will be reforested by industry.

Reforestation Targets and Projections

	Accomplished		Planned	Forecast		
Fiscal Year	2005/ 06	2006/ 07	2007/ 08	2008/ 09	2009/ 10	Long Term (annual)
Planting (ha)	348	2305	6500	5421	12,000	20,000
Sowing			12 M	20 M	20 M	20 M
Site Prep (ha)	480	7400	3500	?	?	?
Reforestation Surveys (ha)	76,600	86,500	70,000	100,000	100,000	100,000
Actual & Projected Budget	$26 million	$15.7 million	$21.68 million	$53.96 million	$53.96 million	$53.96 million

MPB

By 2006 over 400 million m^3 of lodgepole pine had been killed, and by 2015 the cumulative volume killed is projected to be 904 million m3, or 78% of BC's lodgepole pine. Although some of the MPB-attacked stands will be salvage logged and planted, a large proportion will be left to regenerate naturally because of the sheer size and scope of the attack. To refine estimates of potential FFT treatable lands, the Forest Analysis and Inventory Branch supplied a projection of non-recoverable losses (NRL). This analysis showed that approximately 3.2 million hectares (of a total of 5.6 million hectares) of mature stands with more than 70% lodgepole pine might not be salvaged by 2026.

If a conservative estimate of 10% of total NRL is used, then a minimum of 300,000 hectares of mature pine stands affected by the MPB infestation will be suitable for FFT reforestation opportunities. Using a similarly conservative net down estimate, 10% or 80,000 hectares of approximately 800,000 hectares of young pine stands recently identified as at-risk of MPB attack are expected to be suitable as FFT reforestation opportunities.

So if approximately 20,000 hectares (20 million seedlings) are planted each year, it will take 19 years to survey and reforest the 380,000 hectares of mature and immature MPB-impacted areas, which are suitable for FFT reforestation. The FFT program will focus on the younger, immature, non-merchantable stands affected by MPB for the next 3-5 years while planning is underway to transition the reforestation program into mature stands.

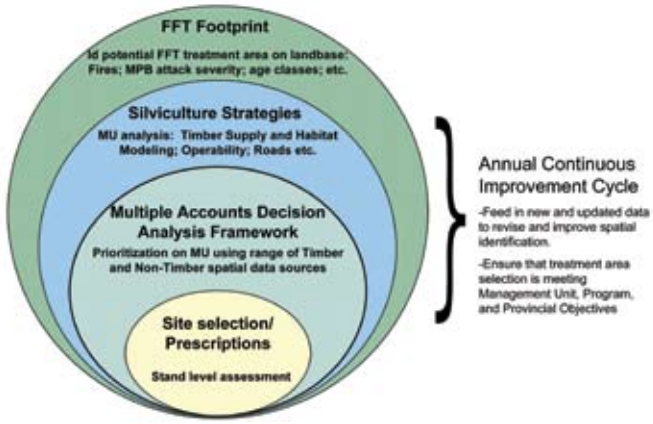
Wildfire

Estimates of fire reforestation activities depend on determination of fire activity, locations, and timber salvage feasibility. In the Southern Interior Forest Region, a review of the 200,000 hectares of stands burned in the 2003-2004 wildfires showed that 40,000 hectares (20%) were eligible for FFT surveys. Of the areas surveyed, 10,000 hectares (25%) were identified for reforestation. Applying these ratios and a 5-year average of fire activity (area burned greater than 250 hectares), reforestation activity is estimated to add 1,000-3,000 hectares per year. With the addition of fire activity areas to the identified MPB-affected areas suitable for FFT reforestation, the total program length is rounded out to 20 years to treat approximately 400,000 ha.

While FFT areas will be selected from ground surveys, the limit of BC silviculture survey resources are an implementation constraint. Surveys have only been undertaken on 140,000 ha, or about 1% of the 13 million ha expected to be impacted. The MPB demand has driven emerging digital aerial data techniques that capitalize on the high contrast of seedlings on days when there is snow ground cover.

More innovation is being invited in 2008. To determine how best to tackle mature non-recoverable losses, up to six pilot contracts will be initiated in the northern and southern interior as site prep contracts. To defer some of the felling, hauling, and site prep costs, the roadside sale value of the standing timber will be allocated with these contracts.

While FFT sites continue to be selected with preference for greater than a 2% discount rate, decision making is now also nested in local landusers' needs and considers cumulative impacts. Including other value factors will increase the benefits of limited dollars.



The link between the FFT Footprint Identification process, Silviculture Strategies and the Multiple Accounts Decision Analysis Framework.

Further research may change FTT's program estimates. The effect on seed viability as the MPB-impacted canopy opens, risking warmed serotinous pinecones also opening and releasing seed into the long warm summer, requires more research. The Chief Forester's Future Forst Ecosystems Initiative is determining how adaptable lodgepole pine species variability is to changing climate parameters. The stand types viable for bioenergy use will inevitably be redefined by operational practices as the industry develops and integrates with the timber and pulp sectors. The risk of fire entering MPB stands is very high and some fires will require an FFT response.

Given the high level of uncertainty created by climate change, it is likely that BC's FTT program will grow.

John McClarnon works at the Forest Practices Branch, BC Ministry of Forests & Range.

Tree Improvement in a Changing Climate

by Brian T. Barber, MA, RPF

Kalamalka Tree Improvement Station. Photo by BCFF

Tree improvement, which is the selection, breeding, testing, and production of trees with desirable traits, has a long and successful history in BC. Selection of coastal Douglas fir “plus trees” and superior provenance testing began in the 1960s. Today, there are breeding programs for ten commercial tree species that focus on improving growth, form, wood quality, and pest resistance. The best performing parents in these programs are established in 99 orchards that produce seed for specific seed planning zones and elevation ranges. 40% of these orchards are managed by the private sector, 30% by the BC Forest Service (BCFS), and the remainder through cooperative arrangements. In 2007, 44% of the 273 million trees sown in BC were derived from orchard seed and 6% were from identified superior provenances. This select seed had an average genetic worth of 14%, which represents the expected timber volume increase at rotation as compared with using untested wild seed. Select seed use is projected to increase to 75% of total provincial seed use by 2013, and the average genetic worth (measured in timber value) is forecast to reach 20% by 2020.

The expected benefits of using select seed include an increased long-term timber supply and improved forest health. Since trees planted on Crown land become the property of government, there are few incentives for licensees to invest in long-term tree improvement activities. As a consequence, breeding is conducted by geneticists working for the BCFS and select seed with a genetic worth of 5% or greater, if available, must be used when planting trees to establish a free growing stand. However, there are also shorter-term benefits to using select seed, including reduced time to achieve free growing and relief from harvest adjacency constraints (e.g. visual and hydrological green-up), reduced brushing and weeding costs, and improved nursery recoveries.

Tree improvement, and other forest genetic resource management (GRM) activities, are coordinated by the Forest Genetics Council of BC (FGC), a multi-stakeholder body appointed by BC’s Chief Forester. The FGC advises the Chief Forester on policy matters, establishes goals and priorities, and allocates public funds from the BC Forest Investment Account to GRM activities.

Climate change was the primary driver identified by members of the GRM community of practice and stakeholders in a recently completed program review undertaken by the FGC. Climate change is also the impetus behind the Chief Forester’s Future Forest Ecosystem Initiative (FFEI). Public expectations for developing responses

to climate change are increasing and governments are setting aggressive targets for reducing greenhouse gas emissions. The FGC and BCFS are now grappling with the challenge of incorporating climate change and carbon management into their goals, programs, and operations. GRM activities will play an important role in mitigating some of the potential impacts of climate change on BC's forests.

In a rapidly warming climate, trees will eventually become maladapted to their environment resulting in reduced productivity and increased susceptibility to extreme weather events (e.g. storms & drought), fire, insects, and disease. Tree populations will have to adapt to these new conditions (through phenotypic plasticity or natural selection), migrate to more suitable areas, or perish. The rate of climate change expected to occur over the next century, however, exceeds the adaptive capacity of most long-lived tree species. As a consequence, one of the few proactive forest management responses to address climate change is to assist or facilitate the migration of species and seed sources through planting.

Researchers at UBC's Centre for Forest Conservation Genetics, BCFS, and other institutions are developing climate models and tools to assist resource managers in developing adaptive strategies. One of these models produced the "flying biogeoclimatic zones" developed by Hamann and Wang (2006), which were featured in Richard Hebda's November 2006 article in *Canadian Silviculture* magazine. Researchers are also using these models, vegetation inventory data, and information from provenance and progeny field tests to project changes in tree species ranges and to identify strategies to reduce losses and increase forest productivity under different climate scenarios (excluding losses due to fires, pests, and weather events, which are expected to increase in frequency).

Although there is some uncertainty about the rate and magnitude of warming and changes in precipitation patterns, especially at regional and landscape levels, these trends are becoming evident and can be improved upon over time. Further development of climate models, combined with applied knowledge of local geography, plant physiology and forest genetics, will assist foresters in selecting species and seed sources more resilient to a changing climate.

Implementing changes to species selection and seed transfer will have implications for a number of forest management and tree improvement policies and practices. These changes could be cumbersome and costly if not appropriately managed and coordinated. For example, public and private forest managers have made significant capital investments in breeding programs, seed orchards, and tree seed inventories. Changes will therefore need to be planned and incremental, yet quick enough to respond to rapid changes in climatic conditions.

Harvesting Mountain Hemlock Orchard Cones.

The genetic worth (for growth) of select seed may still be realized by moving it into areas where the climate is projected to be similar to areas where it has already been tested. Orchard seed is also as genetically diverse as wild seed (if not more). As such, select seed should be as resilient to climate change as wild seed sources. Nonetheless, forest genetics research will need to place greater emphasis on selecting trees for multiple values, including resilience (i.e. adaptation and pest resistance), and conserving the genetic diversity of our native tree species.

Climate change could also adversely affect the physiology and reproductive success of trees (e.g. reduced pollination), potentially requiring supplemental management in seed orchards and relocating existing seed orchards. Over time, advancements in genomics and biotechnology could also assist tree breeders and orchard managers in addressing some of these challenges.

Photo by D. Reid

Barriers and opportunities for implementing changes to species selection and seed transfer within the existing policy framework also need to be considered. For example, the Forest and Range Practices Act (FRPA) does not explicitly obligate persons to take climate change into account when preparing results and strategies. Forest managers will, nonetheless, need to adjust their strategies (including stocking standards) in response to new information and changes in the environment in order to achieve government's timber objective of maintaining or enhancing an economically valuable timber supply and addressing long-term forest health.

Changes to seed transfer could be implemented through amendments to the *Chief Forester's Standards for Seed Use*. These standards would need to be aligned with species selection guidelines, which reside within the non-legal realm of professional reliance. The potential complexity of climate-based seed transfer may not, however, be easily accommodated in a prescriptive set of seed use rules. Other issues associated with facilitate migration, such as potential increased short-term risks and liabilities, will need to be examined and addressed.

Assisted (or facilitated) migration represents a potential "quick win" for responding to climate change. Implementing this strategy will be challenging, but not insurmountable. The FGC recently struck a committee to oversee the planning and process associated with implementing climate-based seed transfer. This process will involve the assessment of current scientific information and models through policy, operational, and information-management lenses. This project will also be integrated with other BCFS climate-change initiatives, including updates to species-selection guidelines, through the auspices of FFEI. Further information and updates regarding this work will be reported to forest managers and stakeholders in the coming months.

For more information on GRM and climate change activities in BC, please visit the following websites:

Harvesting Spruce Orchard Cones, Skimikin.

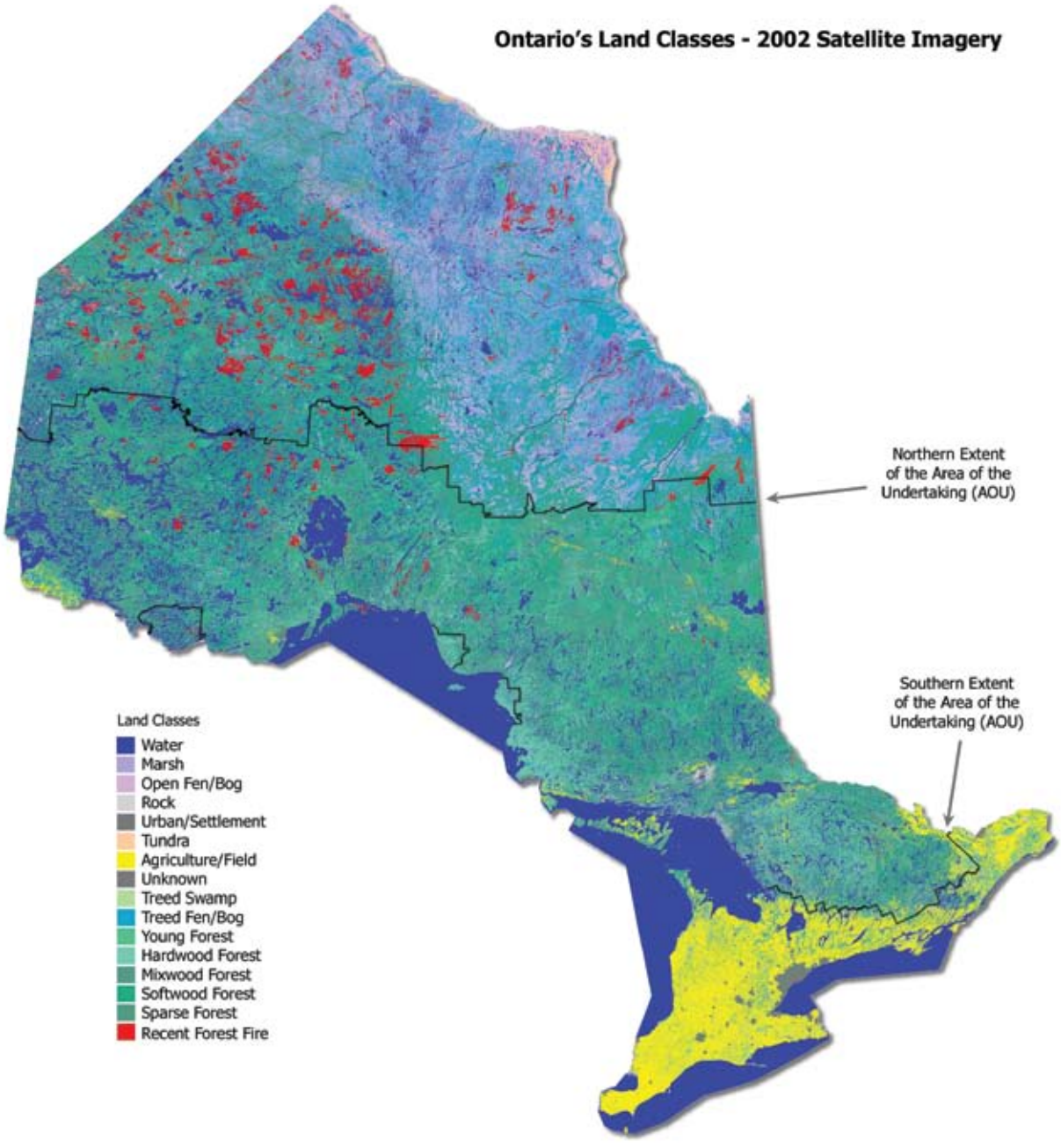
- Tree Improvement Branch, BCFS www.for.gov.bc.ca/hti
- Forest Genetics Section, Research Branch, BCFS www.for.gov.bc.ca/hre/forgen
- Adapting to Climate Change, BCFS www.for.gov.bc.ca/mof/Climate_Change
- Forest Genetics Council of BC www.fgcouncil.bc.ca
- UBC Centre for Forest Conservation Genetics www.genetics.forestry.ubc.ca/cfcg

Brian T. Barber, MA, RPF, is the Assistant Director, Tree Improvement Branch, BC Forest Service and Co-Chair of the Forest Genetics Council of BC. He can be reached at brian.barber@gov.bc.ca.

Timber as a Conservation Value
Ontario Sustainable Forest Tenures

by Dirk Brinkman

At the ninth National Forestry Congress in 2006, Bill Thornton, ADM for the Ontario Ministry of Natural Resources, made a short but compelling presentation on timber as a conservation value when sustainable practices are enforced. Bill has permitted us to reproduce this image so we could share a short synopsis of his presentation, which strongly supports the value of the "reforest what you reap" regulation in place across Canada. It also congratulates the strong stewardship accountability of the forest sector and its reforestation supplier, the silviculture industry. Finally, it illustrates very simply the little told story of how timber value conserves forest ecosystem health.



This image is a coarse satellite image from about 200 km up of Ontario's vegetative cover, and it shows the results of three kinds of land use over 200 years. It becomes clear what the effect of forest tenures has been when we take a holistic look at where forests are and where they are not. The three kinds of land use change are the south urban/rural/agricultural; the middle zone, forest harvest tenures; and the northern unmanaged land now subject to human caused fire and climate change.

The green area is forest, light blue is tundra, and yellow is agricultural and urban land. The area in the north has been unmanaged over the past century. The region in the middle is the "Area of the Undertaking" which over the past half century was managed under various forest tenures. In the last couple of decades all harvest areas were regenerated by the licensee and fire and pest disturbed areas were regenerated from the Future Forest Trust Fund, paid into by the tenure holders.

Look again at the area north of the tenured forests that is marked in green. It is dotted with red patches which shows how much of the forest has burned in the last decade due to warming trends and no management.

Over the last two centuries most of the original forests in Southern Ontario have been converted to farmland. Today forests only cover 7% of the land, and almost all natural ecosystems are fractured remnants. This is the area where 90% of the people in Ontario live and where about 80% of Ontario's plant and animal species considered to be "at risk" are located. In response, some environmental organizations like Nature Conservancy of Canada raise money to purchase private lands to conserve their ecological value, and the government is also allocating funds for education, conservation, and restoration. However, much like in the rest of the urban and developed world, it will cost billions to restore the forest and wetland ecosystems of southern Ontario.

It is in the middle region of Ontario where there have been forest harvest licenses for the past half century, and in the last decades, high forest practice standards, including certification like FSC that we have today's healthiest forest ecosystems. Ontario's historical land use patterns illustrate the potential for high standards of timber practice to have a distinct conservation outcome.

Tree Seed Centres

by Heather Rooke

For nearly 50 years, the Tree Seed Centre (TSC) in BC (part of the BC Ministry of Forests and Range's Forest Stewardship Division, Tree Improvement Branch) has been offering a variety of critical services to a large and diverse group of clients including forest licensees, Ministry of Forests and Range, seed orchards, forest nurseries, tree seed dealers, First Nations, researchers, educators, and the public. The centre is located on 6.7 hectares of land in Surrey. The TSC facilities are comprised of offices, cone preconditioning areas, cone and seed processing and distribution areas, dedicated seed laboratory, coolers, and long-term storage vaults. The TSC has been designated "Mission Critical" within the Ministry's overall business continuation plan.

For many years, the TSC mission has been "Excellence in cone and seed services". The variety of services provided by the TSC, often referred to as the Seed Handling System, form a chain of custody and integral link in a complex gene resource management system. Seedlot diversity, identity, and quality must be maintained and carefully tracked during and after a seedlots active life. The best scientific and technical information guide decision making and continuous improvement. The following quality assurance and stewardship services are provided by the TSC:

Registration

All seed destined for Crown land reforestation is registered. As part of this process, the TSC ensures that seedlots meet applicable collection criteria as specified in the *Chief Forester's Standards for Seed Use* (www.for.gov.bc.ca/code/cfstandards/). The standards include minimum requirements for genetic diversity and physical quality for BC and several northern US species and sources. This information is also used to guide transferability of seedlots to maximize forest productivity. Registration information and data integrity is maintained in a web-based Seed Planning and Registry System (SPAR), which also allows clients to apply for registration online.

Seed Storage

The TSC is responsible for storage and maintenance of optimum physical quality of seeds destined for BC Crown land reforestation. This past year, 5 metric tonnes were added to long-term seed storage (the equivalent of 586 million potential trees), and 3 metric tonnes were withdrawn. The seed inventory also has a risk management role in the event of catastrophic losses resulting from wildfire, insects, disease, and climate change, and includes a dedicated seed bank for gene

Receiving cones for cone and seed processing

conservation purposes. Inventory management activities include the addition of new and returned seedlots; withdrawals for reforestation, research, education, and public relations; seed and seedlot quality and quantity assurance checks; and management of information related to seed availability, ownership, sales/transfers, and history of use. Clients may request that withdrawn seed be forwarded without treatment (dry), pelleted in the case of western red cedar and alder, or stratified using standard or customized methods.

Removing damaged seeds on a gravity table

Seed Testing

Standard tests are performed on new and stored seedlots and include moisture content, purity, seed weight, and germination capacity. Seeds per gram and germination rates are derived from principal test results. X-rays of all new seedlots are also taken. Work in this area is in accordance with International Seed Testing Association (ISTA) and Association of Official Seed Analysts (AOSA) rules, Ministry of Forests and Range seedlot registration policy and/or TSC standards. Quality assurance tests are performed on a portion of a seedlot, a specific point in processing, or on a specific request. Test types, sampling methods, sample sizes, and size and number of replications may vary between quality assurance and standard test types. Seedlots and requests may also be subject to fungal assay testing. Work in the testing business area also supports research trials.

Cone & Seed Processing

Processing of cones and seeds includes detailed seedlot evaluation, conditioning of cones, extraction of seed from cones, and the removal of debris and non-viable seed. Cone and seed evaluation services prior to and during collection and interim storage are provided. Other services include returned seed and seedlot upgrading, research, and small lot processing. As a result of mountain pine beetle concerns and increasing orchard production cone and seed processing volumes are three times that of the past 10-year average, at about 10,000 hectolitres each year. In order to meet increasing production levels, cone and seed processing operations run continuously throughout the year, at times on a multi-shift basis. Staff at the TSC are also seeing an increase in requests for expedited processing and service complexity, particularly for those production, family, and research lots originating from seed orchards.

Information Management

The TSC utilizes a two level information management system. The corporate Seed Planning and Registry (SPAR) web-based system captures seedlot and service request high level and summary data. SPAR is used by both the Ministry of Forests and Range and industry clients. The local Cone and Seed Processing (CONSEP) system captures detailed data, and receives and sends high level and summary data to SPAR. These systems work together to capture and report about seedlots and requests, supporting just-in-time service delivery and decision management. Systems also support financial and administrative operations and play a key role in continuous improvement and knowledge management.

Cone and seed processing

Cone and Seed Improvement

The TSC conducts applied and basic research on tree seed throughout the entire seed handling system, constructs and summarizes quality assurance programs, and performs education, extension, and formal and informal communication activities. Activities in this area play a key role in addressing issues of importance to conifer seed science and technology.

Administrative Operations

Finance and administration staff play a key role in supporting TSC's operations, staff, and budget management. The facilities and site operations team is dedicated to managing and protecting all site, building, and equipment assets.

For more information about the TSC program, its activities and services, visit www.for.gov.bc.ca/hti/treeseedcentre/index.htm.

Heather Rooke is Manager of the Tree Seed Centre, Tree Improvement Branch, and can be contacted at 604-541-1683 x 224 or Heather.Rooke@gov.bc.ca.

With every turn of the key or pull of the cord.

When you're on site, you've only got one thing in mind – getting the job done. And that means you don't have time to worry about whether the power equipment you've invested in will start when you need it. At Honda, we've built our reputation on reliability. Because when you've finished this renovation, we expect you to trust us on the next one too. And, of course, the one after that. 100% Honda – never second guess.

WATER PUMPS
High capacity, efficient. Ready for the toughest jobs.

TRIMMERS
Mini 4-stroke engine. Perfect for big or small jobs.

GENERATORS
Powerful, reliable companions.

HONDA
Power
Equipment

honda.ca

Camrose Motorsports
Camrose, AB
780-672-4095

Lewellin's Sales
Hudson Bay, SK
306 865 2286

Lino's Sales Ltd.
Burns Lake, BC
250-692-7045

Pointe West Honda
Edmonton, AB
780-487-7433
TF: 866-43-HONDA

Riverside Honda
St. Albert, AB
780-458-7227
TF: 800-819-7433

WESTERN

SILVICULTURAL CONTRACTORS' ASSOCIATION

by John Betts

Whose Trees Are These Anyway?

Just a few years ago the BC forest industry was among the most profitable forest sectors on the planet. Considering the current disaster, that fact is a lesson in how unreliable the past can be in predicting the future. Historically, when economies or whole civilizations succumbed to another unforeseen catastrophe, leaders would try and make sense of their predicament through reviewing the omens and portents that had brought them to their regrettable condition. Some negligent priests might have lost their heads. A few other unfortunates might be sacrificed to confirm the general consensus of where the causes laid. Then things would return more or less to normal until the next surprise.

Today our superstition takes a different tack. We use analysts and economists to make sense of current events. Predictably, much has been said lately of the perfect storm of circumstances that has led to this present crisis: a collapsing US housing market; a strong Canadian dollar; and a beetle plague. Compelling as these factors are they suffer from being convenient, particularly if they are taken as the main agents of the current mess. They in fact may be symptoms of a deeper problem announcing itself.

To get some idea of what that deeper circumstance might be, it is important to watch the lines along which things fracture. One obvious fault line is how silviculture obligations can be abdicated by failing licensees and absorbed by silviculture contractors and nurseries. This has led to the untenable circumstance of contractors having stewarded the resource out of their own pockets after restoring or enhancing the public asset through planting or stand tending only to go unpaid by their bankrupt or cash-strapped forest company clients. Nurseries face a version of the same problem as they grow seedlings for clients that may not be able to pay for them at the nursery gate or may renege on their commitments.

The question becomes whose seedlings are these? It is an unambiguous question that deserves an unambiguous answer; one critical to all of us in the silviculture service supply chain as we head into the uncertainties of the 2008 BC forest sector. But it is not just the interests of the silviculture business community that need an answer to the question. The public needs to know that its forest asset is being stewarded for the long term and not exposed to the short term imperatives the present market vagaries and restructuring dictate.

The answer is, of course, the trees belong to the Crown as does the land. Notwithstanding the role of the various licensees and other renters of the resource, ultimately the province must steward the public's asset. This means anticipating the predictable outcomes of the current changes and ensuring at least interim measures to make sure the forest sector continues to grow seedlings, plant them, and pay those who make it their business to perform those activities. Otherwise these businesses and the critical services they provide will be sacrificed to the apparent ambiguity of those who in practice are responsible for forest management in BC.

The WSCA conference will be held February 5-8, 2008 at Sun Peaks Resort. The conference theme is The Turmoil of Transition; Making Sense of BC Forestry Today and into the Future. The disintegration of the historical BC integrated forestry firm, a world class province-wide ecosystem crash, and now another deep ebb in lumber markets could be the making of a perfect storm for forestry in BC. Is it a destructive setback or a dramatic movement forward? Join us at the conference to uncover the answer.

ONTARIO

FOREST RENEWAL CO-OPERATIVE INC.

by William F. Murphy, RPF General Manager

I have had the privilege of knowing and working with Bill Klages, RPF for 37 years. Bill worked for Bowater Inc., based in Thunder Bay, for his entire professional career.

After his recent retirement, Bill and I discussed some of the changes in the silviculture field over the past few decades. My interest was his view on work he'd done with the Forest Renewal Co-op (previously known as LUSTR Coop). His company (Bowater and its predecessor companies such as Avenor and Canadian Pacific Forest Products) has been an active member of the Forest Renewal Co-op for 15 years. The introduction of cold storage to prevent over-winter losses when storing seedlings outside under snow cover meant that tree growers had to convert from using paper pot trays to tubs for shipping live seedlings to the field. Bill talked about working with Hill's Greenhouses, FERIC, Bowater and the Co-op to develop a type of boxing arrangement that would fit into the new cold storage but would also permit proper thawing while facilitating the work of planting contractors and planters. Similarly, he worked with the Co-op to develop a thawing regime for the frozen seedlings. While working with the silviculture contractors, Bill devised a more efficient system of scheduling and transporting tree seedlings to and from the field. He believed that the Co-op was the most efficient vehicle to deliver operational research, which is research that yields immediate improvements and cost savings in daily field operations.

Bill has also been involved with Forest Genetics Ontario through the Superior Woods Tree Improvement Association, and has been able to take these established First Generation Seed Orchards through roging etc. to the point of producing all the jack pine seed needed for Bowater's annual stock production. Bill has also worked towards the establishment of second generation orchards. These will be ready for full production in a few years.

Bill's biggest fear is that the number of mill closures and the slow down in lumber and pulp production will affect further work in tree seedling research, and that as a result of the reduced requirement for tree seedlings on SFLs, some sort of rationalization might eventually lead to fewer tree seedling growers being needed. Bill thinks that this trend will continue until things change in the housing market in the US and the mountain pine beetle salvage is completed in the western provinces, hopefully within the next five years. He feels that for the growers to continue to survive and be productive, they will have to diversify their markets in other areas rather than relying solely on Crown land. Since there is no requirement to replant the areas cut over on private land or to renew vacant farmland to conifer, very little tree planting has occurred. When the OMNR operated the bare root nurseries, they offered seedlings to private landowners for a minimal charge. This encouraged private landowners to replant any areas that they had harvested.

When people are buying private land and then harvesting the timber within miles of a mill, the idea of the provincial government holding the fifty million tree planting program on private land in Southern Ontario's vacant and marginal farmland sites is not right. Since there is no tree planting program for private land harvesting, areas surrounding municipalities and townships are being denuded of their trees. Municipalities are putting in tree cutting bylaws, and they see the Managed Forest Tax Incentive program as a liability to them.

We need to get back to the old Woodlands Improvement Act scenario where people could get tree seedlings funded by the government to put onto their property.

QUEBEC

ASSOCIATION DES ENTREPRENEURS DE TRAVAUX SYLVICOLES

par Audrey Harvey, Responsable des communications, AETSQ

Un nouveau régime forestier pour le Québec

On en parlait depuis longtemps, le Sommet sur l'avenir du secteur forestier québécois a finalement eu lieu. Il s'agit d'un événement sans précédent puisque pour la première fois, les membres de la société civile, et non le gouvernement, décidaient eux-mêmes de se rassembler pour trouver une solution à leurs problèmes. Ce sont donc 400 personnes concernées par la situation de l'industrie forestière qui se sont réunies à Québec les 10, 11 et 12 décembre derniers afin jeter les bases d'un nouveau régime forestier.

En effet, il y a plusieurs mois de cela, des chantiers de travail avaient été mis en place pour tenter de repenser tous les pans de notre industrie. Il était temps de dévoiler les points qui faisaient consensus et ainsi ériger les nouvelles bases de la foresterie québécoise.

Bien que l'événement se soit ouvert sur fond de manifestations, l'heure était aux rapprochements. D'entrée de jeu, tous s'entendaient pour dire que la crise dans laquelle nous sommes plongés n'est pas que purement conjoncturelle. Elle est également structurelle, de là la nécessité de revoir notre fonctionnement en profondeur. Les participants ont également signifié l'importance de redonner à la population son sentiment de fierté vis-à-vis la forêt, un sentiment qui semble s'être effrité avec les années.

Au point de vue de l'aménagement forestier, la cible est ambitieuse : doubler d'ici vingt-cinq ans la valeur des produits de la forêt. En termes clairs, cela veut dire un changement de paradigme. Il faudra désormais penser en terme de valeur, de qualité et non plus uniquement de volume, de mètres cubes. Le défi qui nous attend est de développer simultanément l'ensemble des produits et des usages de la forêt. En effet, il y aura très certainement des choix à faire pour en arriver à un éventail de zones allant de la protection complète jusqu'à l'aménagement forestier intensif.

Un signe des temps, ce Sommet s'est déroulé sous le signe de l'environnement. Tous les intervenants ont exprimé le vœu de compléter, d'ici 2008, le réseau d'aires protégées sur 8% du territoire avec une étude de carence par la suite pour augmenter cette proportion. Même dans son organisation, le Sommet s'est voulu un événement vert qui a misé sur des invitations électroniques plutôt qu'écrites.

Encore du pain sur la planche

Au plan de la structure, le Sommet aura permis d'inviter les partenaires à réfléchir dans le futur sur le mode d'allocation des bois. Le mode de tenure actuelle ne fait pas que des heureux mais par quoi le remplacer ? Les acteurs devront se pencher sur cette question dans les mois à venir. Afin d'harmoniser les relations sur le territoire, un groupe de travail devra se pencher sur la question des relations avec les Premières nations afin de mieux connaître leurs préoccupations et intérêts.

Étouffés par les normes, les professionnels de la forêt veulent se doter d'un système de gestion par objectifs et résultats. Cela permettrait aux professionnels de se donner le choix des moyens sur le terrain, en fonction des particularités territoriales. Pour ce faire, des projets pilotes devront être mis en place pour parvenir à se doter d'un système de gestion par objectifs et résultats d'ici 2013.

Conscient de son potentiel et de sa valeur, un Québec misant sur la recherche et le développement n'en sortirait que plus fort. Les partenaires se sont entendus sur la nécessité d'adopter une politique d'utilisation du matériau bois dans la construction d'édifices publics, institutionnels et commerciaux. Les partenaires, élus municipaux et même le ministre en ont fait mention à diverses reprises lors de ces trois jours.

Finalement, le ministre des Ressources naturelles et de la Faune, Claude Béchard, a bien pris acte des travaux du Sommet. Il s'est engagé à déposer son Livre vert d'ici janvier 2008. Il s'agit d'un panier de propositions qui nous permettra de construire un nouveau régime forestier. Ces propositions seront, à son dire, très près de celles exprimées lors du Sommet.

Quel que soit le futur, le Sommet aura à tout le moins permis d'établir une collaboration sans précédent entre les acteurs en présence et de dessiner les premières lignes d'un nouveau régime forestier. Ceci laisse présager de bonnes choses pour l'avenir puisque tous se sont entendus pour poursuivre les travaux au-delà du Sommet.

QUEBEC

ASSOCIATION OF SILVICULTURE CONTRACTORS

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

A New Forestry Régime for Quebec

Talked about for a long time, the Summit on the Future of the Forestry Sector in Quebec has finally taken place. It was an unprecedented event, because, for the first time, members of civil society, and not the government, decided on their own to meet and to find a solution for their problems. Thus 400 persons concerned about the situation of the forestry industry gathered in Quebec City on December 10-12, 2007 to lay the foundations for a new forestry régime.

Several months ago, in fact, workshops had been set up to attempt to rethink all aspects of our industry. It was time to discover the points on which there was consensus and thus to create a new basis for Quebec forestry.

Although the event began against a background of protests, there was a desire for agreement. All present were united at once in saying that the crisis in which we are involved is not only a current economic one, but is also systemic, hence the need to reexamine our operation in depth. The participants also stressed the importance of restoring a feeling of pride in the forest to the population, a feeling that seems to have eroded over the years.

With respect to forestry management, the target is ambitious: to double the value of forestry products over the next 25 years. Put more clearly, that means a change of paradigm. From now on, we must think in terms of value and quality, and no longer exclusively in terms of volume and cubic metres. The challenge that faces us is that of simultaneously developing the whole range of forestry products and practices. It is evident that there will clearly be choices to be made in order to arrive at a series of alternatives that range from complete protection to intensive forestry management.

It was a sign of the times that this Summit took place amidst a concern for the environment. All the speakers expressed a wish to complete, during the coming year, the network of protected areas totaling 8% of the territory, with a subsequent shortfall study to increase this proportion. Even in its organization, the Summit tried to be a green event by depending on electronic invitations rather than written ones.

Still work to be done

At the structural level, the Summit made it possible to invite the partners to reflect on how wood should be allocated in the future. The present system of tenure doesn't please everyone, but what should replace it? Those involved will have to concern themselves with this question in the coming months. In order to harmonize human contacts in the province, a working group will have to examine the matter of relations with the First Nations to ascertain their preoccupations and interests.

Stifled by standards, forestry professionals want to move to an administrative system based on objectives and results. That would allow them to choose their methods on the ground, taking account of local peculiarities. To do this, pilot projects will have to be set up to ensure a management system by objectives and results can be in place by 2013.

Aware of its potential and its value, a Quebec emphasizing research and development can not help becoming stronger. The partners agreed that it was necessary to adopt a policy of utilizing timber in the construction of public, institutional, and commercial buildings. Elected municipal officials and even the Minister made repeated mention of this matter during the three-day meeting.

Finally, the Minister of Natural Resources and Wildlife, Claude Béchard, took the activities of the Summit under advisement, undertaking to table his Green Paper by January 2008. It will offer a range of proposals that will allow the creation of a new forestry régime. The Minister indicates that his proposals will be very close to those put forward by the Summit.

Whatever the future may bring, the Summit will at least have made possible an unprecedented cooperation between the existing stakeholders and the outlining of a new forestry régime. This provides hope for positive steps in the future, as there was general agreement about continuing these discussions beyond the Summit.

NOVA SCOTIA

FEDERATION OF NOVA SCOTIA WOODLAND OWNERS

by Mike Hutchinson

Promoting Uneven-Aged Forest Management: Dollars and Sense

At the year's end, there were some positive developments in Nova Scotia's silviculture industry. After years of lobbying and proposals by several woodlot owner and environmental groups for more support from the forest industry and the provincial government in the promotion of uneven-aged forest management in the province's silviculture program, the Nova Scotia Department of Natural Resources has recently allotted $443,000 for Category 7 treatment funding, and $70,000 for a one-year, educational outreach program for contractors and woodlot owners on uneven-aged forest management practices.

The funding portion of the new program for on-the-ground work is being administered by the Association for Sustainable Forestry. Woodlot owners and silviculture contractors can apply for the funding on a per-hectare basis to help offset the costs of stand improvement work included in the Category 7 treatments. The educational outreach program is being administered by the Nova Scotia Woodlot Owners and Operators Association, and implemented by private forestry consultants. Some outlined objectives of this program are: to educate woodlot owners and contractors on techniques and logistics of performing uneven-aged management treatments; distributing information material throughout the forestry community with regard to the benefits of Category 7 treatments; and compiling feedback from woodlot owners and contractors on challenges they face while performing these treatments.

The provincial silviculture program (Registry of Buyers Program) is divided into seven categories, including regeneration surveys, site preparation and planting, manual and chemical competition control, pre-commercial thinning for natural and planted stands, commercial thinning, and finally, Category 7 treatments which include (a) crop tree release, (b) crop tree pruning, and (c) selection management. Since the beginning of this program in 2000, Registered Buyers (any person or business acquiring more than 5,000 cubic metres of primary forest products per year) have been responsible for administering a silviculture program on private land, or paying into a provincial fund, in proportion to the amount of purchased forest products the year prior.

To date, the lion's share of treatment funding has been spent on plantation establishment, chemical weeding, and pre-commercial thinning, all of which promote the cycle of even-aged management. In many areas of our province, there are few options for regenerating mature softwood stands of balsam fir and/or white spruce. Pure stands of white spruce are often of old field origin with shallow root systems and susceptibility to red heart. Natural stands of white spruce and balsam fir are often mixed with intolerant hardwood species such as red maple, white birch, or trembling aspen. Mature forest stands with these compositions are not well suited to intermediate harvests and are best managed using even-aged techniques.

Conversely, much of the province is blessed with our unique Acadian Forest type that extends into New Brunswick, PEI and the northern areas of New England. We enjoy a diverse mix of shade tolerant, deciduous, and coniferous species that have been historically managed with some form of selection harvesting. (Unfortunately, much of this has been high-grading). The push for more education and general acceptance of uneven-aged management practices in Nova Scotia's forest industry stems from the realization that this forest type cannot be sustainably managed using the final harvest, plant, and spray model. Thirty years of rampant industrial forest management has displaced thousands of acres of Acadian mixed wood stands with softwood plantations where fiber production to feed pulp mills has been the main objective. As the industrial forestry sector continues its downward slide, woodlot owners are becoming increasingly involved with the conservation of their woodland, and many have realized that there are more opportunities available from their land than simply growing fiber.

It's all about using the right tool for the job. If woodland is of abandoned farmland origin and naturally grows short rotation softwood and low quality hardwoods, final harvesting of mature timber with artificial regeneration is likely the best management tool. In a mixed wood forest of shade tolerant hardwoods (sugar maple, yellow birch, white ash) and softwoods (red spruce, black spruce, white pine, eastern hemlock), maintenance of stand composition should be considered when planning a tending or regeneration treatment.

Tools for tending treatments could include crop tree release or crop tree pruning, which significantly increases the potential log value component of the stand while largely conserving species and age composition. Regeneration harvests have numerous forms depending on treatment objectives, but should always focus on naturally regenerating species present in the stand. One available tool for this type of treatment is selection management. Treatment criteria in our present program are designed to favour single-tree selection methods of harvesting, which is why the educational outreach program is so important.

Single tree selection harvests are difficult to master, both silviculturally and financially speaking. The treatment can easily turn out as a high-grade, while still passing post-treatment quality criteria for basal area and species composition. The landowner and/or contractor needs to have a clear understanding of the treatment objectives and expected revenues before commencing work. Logistical details such as choice of extraction method, product marketing, working conditions, and weather are all factors to be considered when planning a selection harvest. Consultants from the outreach program will be able to provide a second opinion and some experienced guidance over the next year, which will be a certain benefit to interested landowners and contractors. It will also help to protect and enhance what's left of our Acadian forest.

Mike Hutchinson is a forest technician and silviculture contractor/consultant in Nova Scotia, currently an interim board member of the Federation of Nova Scotia Woodland Owners, representing western Nova Scotia. For more information concerning the Registry of Buyers Program or any other woodlot management issues in Nova Scotia, please contact our office at (902)639-2041 or email to info@fnswo.ca

Forest Health

by John A. Muir and Warren Warttig

Monitoring Dwarf Mistletoe

Dwarf mistletoe is common in coastal western hemlock forests from northern California to southeastern Alaska. This parasite grows on live trees (Figure 1), causing swellings on branches and boles as well as proliferations of branches called "witches' brooms" (Figure 2). These effects can persist for many decades, reducing wood quality and tree growth and becoming more pronounced as the tree ages.

In coastal BC, current variable retention (VR) harvesting practices often leave mistletoe-infested trees in cutblocks. Previous clearcut harvesting and even-aged silvicultural regimes almost completely eradicated dwarf mistletoe-infested trees from second-growth hemlock forests, reducing or preventing impacts. The resulting low incidence of the parasite suggests that dwarf mistletoe may be ignored or disregarded in VR harvest systems. However, based on current findings, it is believed that infested trees in VR-harvested forests should produce more extensive and more severe infestations of dwarf mistletoe.

In the past, monitoring programs lacked detail on most disease infestations, including dwarf mistletoe. Therefore, starting in 2005, as part of International Forest Products Ltd. (Interfor) certification requirements to ensure sustainability of forest practices, several projects were initiated to develop techniques to monitor dwarf mistletoe infestations.

A comprehensive monitoring program for dwarf mistletoe requires several pieces of data including: distribution of mistletoe-infested residual trees; mistletoe seed production on, and dispersal from, infected residual trees; and infection of young trees and development of pathogenic effects. Ideally, these components should be determined by forest-level sampling of infested trees and monitoring infestations for several decades in designed, replicated blocks. However, incidences and impacts of dwarf mistletoe have proven to be highly variable, and substantial long-term funding was unavailable for these types of studies.

The initial approach was to monitor spread and infection of dwarf mistletoe by establishing a plot around the base of selected, infested residual trees in five to ten-year-old VR cutblocks. This does not provide an unbiased sample, but should provide valuable data from infested trees in a broad geographical area. To minimize costs, readily accessible areas were selected to serve as convenient demonstration sites and to facilitate re-measurements. Between 2005 and 2007, low elevation monitoring sites (less than 700 m) were monitored in the coastal western hemlock biogeoclimatic zone near Ucluelet, Port Alice, Port McNeill, and Courtenay. On each 11.28m radius plot the number of mistletoe-infested and non-infested trees was recorded, including residual and regenerating young trees, and the approximate location of each infested tree was mapped. Unexpectedly, in all but one of 33 monitoring plots established, dwarf mistletoe infected only 1% or less of the young hemlock trees. These plots will be re-assessed periodically to evaluate further trends.

In 2005, 2006, and 2007 dwarf mistletoe seed dispersal was monitored by establishing seed traps at approximately 4m from the base of two severely infested trees near Ucluelet. An average of 4.5 mistletoe seeds per m2 were dispersed from these trees, which was far less than expected, suggesting that mistletoe seed production could limit dwarf mistletoe infection of the seedlings.

In 2007, the feasibility of using aerial surveys to detect dwarf mistletoe infestations was investigated. A slow speed, low-level helicopter flight was taken and a digital video camera recorder was used to document visual incidence, coupled with a hand-held GPS to record locations of infested trees. This kind of detailed survey appears promising for detecting and characterizing dwarf mistletoe infestations on residual trees in VR areas. Additional work is required to characterize tree condition, define severity ratings per tree, determine accuracy of aerial surveys, and develop methods for recording survey data.

Further work is still required to determine the onset and degree of effects of dwarf mistletoe on growth and wood quality of thrifty, second-growth hemlock.

John A. Muir, PhD, RPF is a forest pathologist with John Muir Consulting in Victoria, BC and can be reached at johnmuir@consultant.com. Warren Warttig, RPBio is a planning biologist at International Forest Products Ltd. in Campbell River, BC.

Fig.1: Dwarf mistletoe infection showing branch swelling and aerial shoots of the parasite on western hemlock seedling in a monitoring plot near Ucluelet, BC.

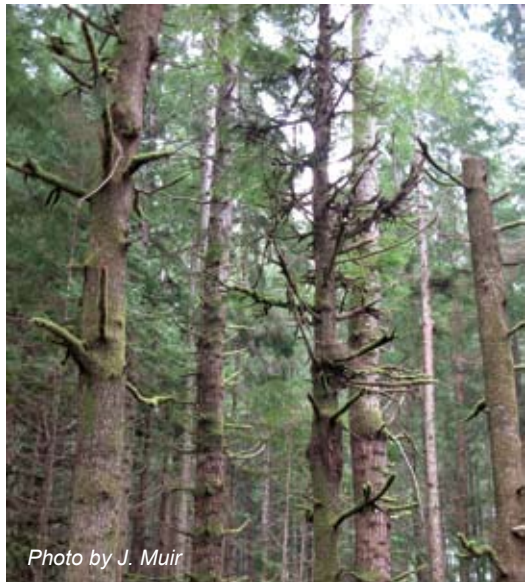


Fig. 2: Dwarf mistletoe infection of western hemlock at China Beach Provincial Park, near Jordan River, BC, showing bole and branch swellings, including witches' brooms.

Inexpensive Regeneration of Acadian Forests

by Peter Salonius

The Acadian forest occupies a transition zone between boreal and temperate life zones, covering most of the Canadian Maritimes and a considerable portion of the northeastern United States. The species assemblages in the Acadian forest are similar to those in the transitional Great Lakes St. Lawrence forest zone and both have experienced large species shifts as a result of current harvesting practices.

During the October 2007 Acadian Forest Science Conference (AFSC) in Fredericton, New Brunswick, presentations were grouped into the following subjects: history, ecology, conservation, and management. Several papers characterized the massive changes that have occurred in temperate forests in eastern North America during the last 200 years. One outstanding example using soil charcoal assemblages revealed no evidence of jack pine in Kouchibouguac National Park before European contact. The increasing representation of jack pine in that area appears to have been facilitated by frequent human-caused fires during the last 200 years. Another report from an undisturbed forest reserve in northern Maine found consistent dominance by shade tolerant tree species and little evidence of fire during the last 2,000 years. Conventionally managed areas surrounding the undisturbed reserve were dominated by assemblages of northern species that were very sparsely represented in the virgin forest.

Several historical reconstructions suggested that much of the temperate Acadian tree species assemblage has been replaced by formerly rare, exposure resistant northern species as a result of recent forest practices that have made no effort to approximate the natural gap disturbance dynamics that drove succession in the native forest. A study dealing with tree islands left as refuges for slow spreading, microclimate-sensitive lesser vegetation species revealed that distances between the hot, dry microclimate and the large adjacent clear-cut blocks influenced the interiors of the unharvested forest patches.

Mapping current and modeled future species distribution, based on various likely climate change scenarios, showed that most of the now more prominent boreal species that are favoured by block clear-

cutting, including balsam fir, white spruce, black spruce, jack pine, tamarack and trembling aspen, would be expected to be increasingly stressed by climate warming during the next century.

Most temperate Acadian species that are expected to adapt better to climate warming do not regenerate well in the exposed conditions that are created by conventional large-canopy-opening clear-cutting, or in seed tree cuts that leave minimal numbers of mature trees on the landscape. Successful regeneration of exposure-prone sugar maple, white ash, white pine, red spruce and eastern hemlock depends on the creation of a cool, moist, post harvest environment with side shelter from extreme temperatures and drying winds, while growth rates of these species are enhanced by increasing light levels.

The predominant stand replacement dynamic in the original Acadian forest was reported to have been gap replacement. Structures such as large trees, trees with cavities, large standing dead trees, and large dead fallen trees, characteristic of former old growth forests are rare and disappearing. These old growth structures were shown by various speakers at the conference to be important in the life cycles of various animal and plant species that had evolved in their presence; these species may be important for healthy ecosystem function and forest productivity.

Both New Brunswick and Nova Scotia have recently mapped their forest lands as being driven either by gap replacement or stand replacement dynamics. Gap replacement forests are characterized by small disturbances, though they can experience catastrophic stand destruction by wind throw and/or fire at intervals of many centuries to several millennia. Stand replacement forests undergo the same gap replacement regeneration dynamics, but they are interrupted by large catastrophic stand replacement, by wind, fire, insects, and diseases, more regularly than gap replacement forest types in their natural state. The regular and repeated block clear-cutting that

has dominated harvesting practices in the Acadian forest in recent decades creates the same type of regeneration dynamics and species assemblages produced by the catastrophic stand destruction found in boreal areas.

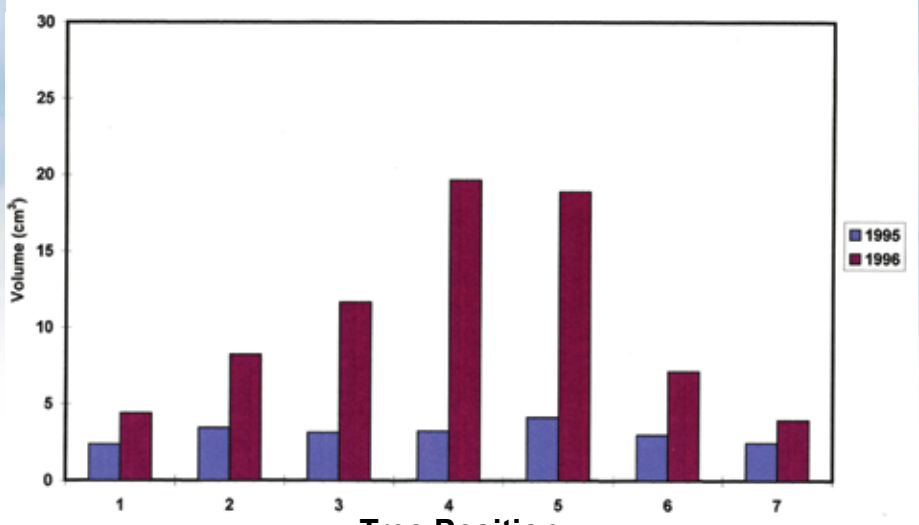
There was reference at the conference to several other recent harvesting developments that are transforming Acadian forests, those of full tree harvesting and slash gathering, which concentrate nutrient rich fine branches and foliage for use as biomass for energy and chemical production. These practices have the potential to lower the level of plant nutrients on forest sites and thus jeopardize long-term site productivity in an energy scarce future when the use of replacement fertilizers will cease to be a viable option.

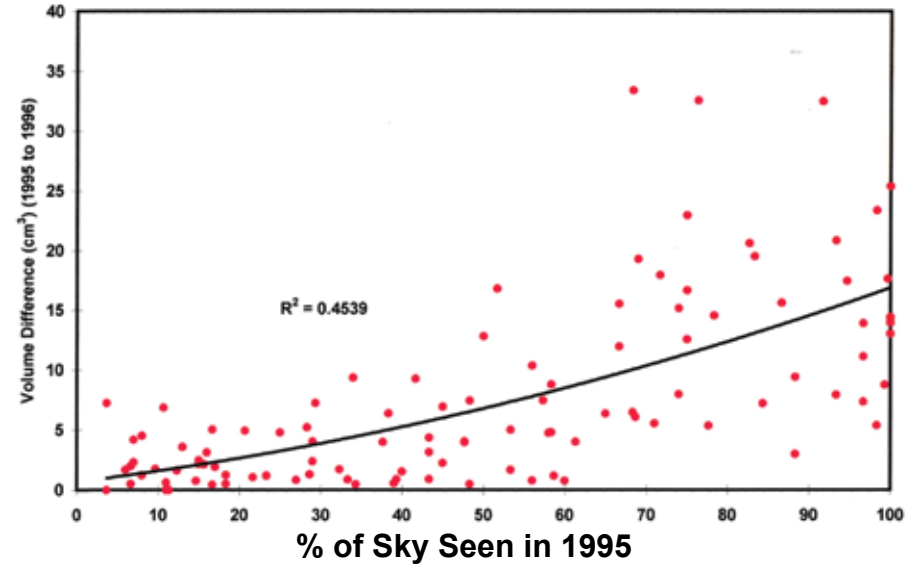
There was considerable discussion, both during the conference and on the field trip in southern New Brunswick afterwards, about the capability of harvest methods that approximate gap replacement (patch, strip, shelterwood, and selection) to successfully regenerate lowland spruce flats that are classified as stand replacement forest types. These are forests that are presently often subjected to large-canopy-opening clear-cut harvests. Land harvested in this manner must often be artificially regenerated by some combination of mechanical site preparation, planting, thinning and competition control by chemical herbicides, because few seed-producing trees are left close to sites requiring new trees. This expensive remediation planting has continued in large measure because the expense of this silvicultural fix is borne by taxpayers, not by the Crown land licensees that harvest the wood.

In the last few years there has been an increasing groundswell of opposition to the continued expenditure of taxpayer dollars in support of silviculture that is directed, by planting and thinning, to growing mostly boreal softwoods like jack pine, black spruce and white spruce for the shrinking pulp, paper and saw timber market. Reference was made at the conference to the opportunity that exists for changing forest practices on Crown land at a time when the pulp and paper market is being taken over by producers outside North America, and when the long-term future of lumber exports to serve the US framing market is in doubt.

People on the field tour saw very successful regeneration of spruce, fir, birch, and white pine as a result of strip and patch harvesting. They were also exposed to the phenomenon

RED SPRUCE
Strip Width: 20m jiffy (Planted in 1995)





of massive uneconomic grey birch regeneration that results when significant amounts of mineral soil are exposed by site preparation equipment on the poorest of these sites. The shelter and somewhat lower direct sunlight offered by the residual forest surrounding harvested patches and strips decreased the incidence of weevil attack on regenerating white pine, and also the vigour of competing early successional competitor species such as raspberry and pin cherry.

Modified, non clear-cut harvesting is already required on about one third of New Brunswick Crown land in order to maintain and restore some of the mature forest structural elements that are missing from the modern working forest. Industry calls this the "restrained forest". It would appear that such modified harvesting practices can be successfully applied to almost all Acadian forest types.


Photo by Don Cameron

Modified harvesting is somewhat more expensive than large-scale clear felling because machinery must be moved more often. However, a minor portion of the taxpayer subsidies that are currently devoted to intensive softwood silviculture on Crown land, could be redirected to subsidize the extra costs of alternative harvesting methods. Such practices as patch, strip, selection, and shelterwood harvesting produce very low-cost regeneration without the expensive, taxpayer-financed plantation and thinning practices that have had to become the norm on most of the stand replacement forest and much of the gap replacement forest, because of harvesting methods that have made no effort to approximate natural Acadian disturbance dynamics.

Peter Salonius, one of the speakers at the AFSC, is a Canadian Forest Service research scientist, in the Canadian Wood Fibre Centre at Fredericton, NB. A version of this article was published in the January 2008 issue of the *Atlantic Forestry Review*.

Getting Tree Planting Fit

by Steve Mueller

As you gear up for another season, your checklist may look something like this:

- ☑ 2008 contracts negotiated and secured
- ☑ Equipment repairs and annual maintenance
- ☑ Crews recruited and hired
- ☑ Supervisors trained in safety responibilities
- ☑ ATV training provided for crew leaders
- ☑ Off road/resource road driving course for drivers
- ☑ Safety program reviewed and revised

You've pretty much covered all the bases in terms of safety - but what about health? What are you doing to encourage workers to arrive fit and ready for a summer in the woods?

As many tree planters have learned, there is fit, and then there is tree planting fit. The reality for most is that a regular fitness program won't necessarily get you ready for the type of stress and physical output required by a summer on the cut block. According to WorkSafeBC, a tree planter who plants 1,200 trees a day:

- Lifts a cumulative weight of more than 1,000 kilograms
- Bends more than 200 times per hour
- Drives the shovel into the ground more than 200 times per hour
- Travels about 16 kilometres on foot while carrying heavy loads of seedlings

You can help your workers be prepared by encouraging them to use a free, web-based fitness program that is no secret to savvy contractors since its release in 2004. The Fit To Plant program, developed by Dr. Delia Roberts, helps workers to avoid injury and go home safely at the end of the season. The program is based on the outcome of her 2003 study that showed how improving fitness levels and diet can minimize the risk of injury and enhance planting productivity.

Daily workouts are generally about 20-30 minutes in length, with one longer session a week, and include both aerobic power training as well as exercises to strengthen specific muscles and tendons.

Dr. Roberts' study revealed that tree planters who use the eight-week pre-season training program experienced 40% fewer injuries and illnesses than planters who did not train. The Fit To Plant program also helps tree planters to:

- Increase their aerobic power so they can move fast all day
- Strengthen their muscles and tendons to protect against wear and tear
- Speed up their reflexes to protect their joints
- Plant up to 12.5% more trees

According to initial testing, on average planters worked an impressive 6 hours/day at heart rates between 60 and 80% of maximum

heart-rate and carried over 30% of their body weight in their planting bags. To fuel all this work, planters consumed approximately 5,000 calories per day, but could not meet their energy needs, loosing an average of nearly 2 kg over the 18 days of the study. Planters were working as hard as many elite athletes, without proper preparation and nutrition. No wonder so many of them were getting hurt!

When asked how her program could help someone to avoid two of the most common tree planting injuries (tendonitis and spraining a leg by falling on the ground), Dr. Roberts explained, "Pre-training the muscle and its connective tissue attachment to the bone (i.e. the tendon) in a slow, progressive manner accustoms these tissues to withstand the repetitive nature and sudden forces experienced during planting without sustaining the small injuries that lead to inflammation of the tendon. With a stronger core and better muscle activation patterns, the planter's balance will be better. He will step more positively (with more muscle control), and have more energy available to concentrate on walking through slash."

Planters can also improve performance by using electrolyte beverages containing carbohydrates rather than just water to avoid dehydration. These beverages help prevent the drops in blood sugar known as bonking (loss of concentration, poor muscle coordination, slowing of reflexes and suppressed immunity), thereby avoiding the middle-of-the-afternoon slowdown of planting. Planters also didn't feel as exhausted at the end of the day, and that they were able to plant successive high output days.

If someone offered you a surefire method to increase your overall productivity by more than 10%, wouldn't you jump at it? The catch is that you are going to have to get everyone involved - your workers, camp cooks, and, initially, your management staff - in order to realize the benefits. Fortunately, almost every worker will have an email address and you can set up email lists to get the information out.

"Email is the main way of conversing with our workforce," says Chris Akehurst, of Akehurst & Giltrap Reforestation, who reminds his workers about the Fit To Plant program every January when he emails their T-4 slips.

Chris describes how the program has helped workers at Akehurst & Giltrap Reforestation camps: "You get a reduction in the number of nagging injuries. We get a lot of sprains and strains - sore back, sore wrists, sore elbows. If someone comes fit, incidents of that type of injury are greatly reduced," he says. "From the planters' point of view, just looking at money, they can make more money if they're fit. Secondly and perhaps most importantly, they don't push their body where it doesn't want to go when it's not ready to go there."

Of course, you can't control what your workers do with the information once they have it. There are many distractions and reasons why workouts get short changed. Sending a reminder by email is a good first step, but it's important to follow up and do more to get everyone on board. Garth Hadley, owner of Coast Range Contracting, describes the challenge of influencing a worker's choice to get fit for planting.

"You get the information out there and you remind them of it, and then what do you do from there? How do you actually get five or 10% more people doing it?" Garth asks. "Our business is such a funny one. We only work with these people a maximum of two to three months a year and it's tough for us to make demands on their lifestyle or life - even though we know it's in their best interest and they know that too."

WOMEN TREE PLANTERS

by Dr. Delia Roberts

Female tree planters make up about 33% of the total planting population, and generally 3 of the top ten highballers in a camp are women. Interestingly, women are only responsible for 26% of lost time claims, but make up 50% of alternate duty days. Women carry the same weight in their bags as men, but due to their smaller body size it means that women are carrying about 30% of body mass, while men carry only 24%. Both the physiological and biochemical data show that women are working at a higher intensity than men, but that they are able to meet the performance demands of this rigorous occupation as well as men do.

One solution is to provide additional incentives to workers who make the investment, by giving them t-shirts, hats, or a cash bonus. You may also want to invest in a more substantial incentive and hold a draw for the prize. At first glance, this may seem too expensive to fit within tight profit lines - but remember that more fit workers means less injuries. Your return on investment will be a savings in claim costs and less lost productivity down the road.

Even though musculo-skeletal injuries from tree planting are not generally classified as "serious" injuries, Dr. Roberts reminds us of their serious impact on workers' lives. "How serious is it if you can't plant this summer and don't have enough money to live on next year?" she asks. "How serious is it if you have joint damage that results in cartilage degeneration and ultimately osteoarthritis? How serious is it if you hurt your back and can't participate in the activities you love to do?"

For more information, visit:

Dr. Roberts' program: Fit To Plant
www.selkirk.ca/research/facultyresearch/tree planting

WorkSafeBC's Preventing Tree Planting Injuries
xrl.us/bbz7c

WorkSafeBC's MSI Prevention Bulletin 6 - Tree Planting
xrl.us/bbz7x

Treeplanting.com's Special Advisory for Women
xrl.us/bbz35

A & G Reforestation's Planter Health and Safety Notes
www.agreforestation.ca

Coast Range Contracting - Health and Safety
www.coastrange.ca/employees/health.html

Steve Mueller is the Director of Forest Worker Development at the BC Forest Safety Council and a former tree planter. More information on the Council is found at www.bcforestsafe.org.

MUSCULO-SKELETAL INJURIES IN THE BC SILVICULTURE SECTOR

In 2006, there were 505 silviculture companies working in BC and WorkSafeBC paid $3,534,989 in claims costs. The sector had 8,012 days lost due to injury, down from 11,462 in 2005.

From 2002 to 2006, the most common injuries to BC tree planters were: sprains, strains, and tears (41%) and inflammation and irritation of joints, tendons, muscles and connective tissues (11%). The body parts most often injured are: legs (22%); back (11%); ankles (8%); wrists (8%); and arms (7%). The most common causes of injury are: falls from same level (18%); repetitive motion (14%); and struck by object (13%).

Injury rates in 2006 were 9 claims per 100 person-years of employment, down from 11 in 2005 and 2004, 12 in 2003, and 15 in 2002. One person-year is the equivalent of 52 paid weeks of employment, worked by one individual or several.

A Tribute to Charles Manlius Johnson

1936-2007

Charles (Charlie) Manlius Johnson, a long time BC MoF forester, one of the co-founders of PRT (Pacific Regeneration Technologies Inc.) and a life-long member of the forestry community, passed away unexpectedly on December 29, 2007 in Vancouver surrounded by his family.

After graduating from UBC's Faculty of Forestry in the early 1960s, Charlie went to work for the MoF. In 1987, while he was Director of the Silviculture Branch in Victoria, Charlie learned of the BC government's plan to privatize MoF nurseries. He and co-worker, Ev Van Eerden, formed an employee-owned company to buy some of the nurseries. Charlie's entrepreneurship and ability to engage others in the pursuit of this vision were evident as he started PRT.

Charlie worked hard at developing relationships and cementing the support of anxious employees. There was no one better than Charlie to bring and keep them together in pursuit of a common vision. PRT's first bid failed but the second publicly tendered bid succeeded, and PRT was born on September 1, 1988. Charlie said, "The most important asset we bought with the purchase of the 6 nurseries was the employees' expertise and dedication."

As PRT President, Charlie supported research projects and instituted PRT scholarships at various institutions. After acquiring a small tissue culture company, PRT learned of a group of scientists at the University of Saskatchewan who were engaged in somatic embryogenesis. This merged group became Pacific Biotechnologies Inc. and subsequently CellFor. Later, CellFor was split off and continues as a successful, independent organization.

The nurseries continued to develop and grow to such an extent that PRT was taken public as an Income Trust Fund in 1997. It was an achievement that everyone was proud of.

After Charlie retired, he stayed in touch, visiting with employees at every opportunity. PRT's theme line, "Altogether a Better Approach", really sums up Charlie Johnson. He will be fondly remembered by all the people who worked with him and those who merely had the pleasure of meeting him.

He was a generous father, friend, and colleague. He is survived by Sue, his wife of 45 years, children Tom (Heather Ramsay) and Karen (John Stephenson), grandchildren Robin Johnson and Niva, Linnea, Sarah, and Gord Stephenson. He is also survived by his sister, Claire Shaw, and brothers, Ken Johnson and Bob Johnson (Betty), and numerous well loved cousins, nieces, and nephews.

Index to Advertisers

Arbortec Industries	28
BC Forest Safety Council	29
Beaver Plastics	16
DK Heli-Cropper International	9
Deakin Industries	17
DENIS CIMAF	30
Dram Ventures	30
Globalstar	11
Honda ATV	IBC
Honda Power Equipment	15
ICOM Canada	BC
Jiffy Products	18
Marine Link Transportation	19
Motorola	IFC
Silvatech Development	30

MORE POWER.
ELEVATED PERFORMANCE.

THE ALL-IN-ONE TRX420FE/FM
A NEW LEVEL OF PERFORMANCE

Get ready for a lot more power - and that's just the beginning. We've taken everything that made the TRX350 the most popular ATV in its class and upped the ante with an all-new liquid-cooled 420cc engine for a big boost in power and torque, programmed fuel injection, switchable 2WD/4WD for perfect traction, front disc brakes, and more features than you can imagine. The new more powerful TRX420. Rise to the occasion.

Blackfoot Motosports
Calgary, AB
403-243-2636

Gateway Honda
Edson, AB
780-723-6608

Honda Shop
High Prairie, AB
780-523-3904

Lino's Sales Ltd.
Burns Lake, BC
250-692-7045

Mile Zero Motorsports
Dawson Creek, BC
250-782-4808

Neid Enterprises Ltd.
Terrace, BC
250-635-3478

HONDA
BEST ON EARTH™

Always wear a helmet, eye protection and protective clothing and please respect the environment.
Obey the law and read your owner's manual thoroughly. Honda recommends taking an ATV rider training course.

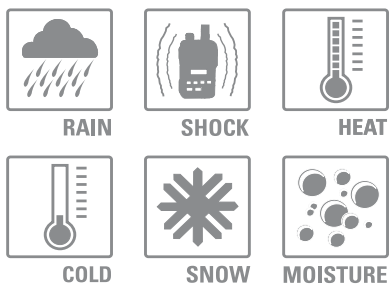
honda.ca

What's Your Element?

(Icom's Submersible Handheld)

F50 SERIES: ENVIRONMENTAL PROTECTION

- IPX7 waterproof protection
- Powerful Li-ion battery with protective "shock absorption design"
- Compact design, durable construction
- Intrinsically safe version available which meets FMRC approval for use in hazardous environments



The rugged F50 series is built to meet or exceed tough MIL STD specs, and it's rated JIS-7 submersible.

FOR MORE INFORMATION:

(w) www.icomcanada.com
(e) info@icomcanada.com
(p) 604-952-4266

AMATEUR | AVIONIC | **LAND MOBILE** | MARINE | RECEIVER

ICOM®