



# e-Bulletin



The Great Lakes Forestry Centre (GLFC)

## Calling all citizen scientists

### Overview

*Get a “Budworm Tracker” kit and help scientists monitor spruce budworm migration and population growth.*

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We are embarking on a first-of-its-kind program to help track the spruce budworm and we need your help. NRCan CFS scientists across eastern and central Canada are teaming up with local interest groups and provincial partners to track spruce budworm migration and population growth. The commitment is simple: you will be asked to set up a pheromone trap to collect male spruce budworm moths and, depending on your level of involvement, you can choose to collect moths once, twice or three times a week. Moths will be bagged and stored in a freezer then sent to your local coordinator at the end of the season. Data can be entered via smart phone app, website log-in or old fashion pen and paper, and all results can be tracked up to the minute on our new Budworm Tracker Website (in progress)! Interested parties can contact [Chris MacQuarrie](#) to sign-up to receive a Budworm Tracker kit and become part of the team.

## Turkey Lakes Watershed Science Workshop held in Sault Ste. Marie

### Overview

*This workshop, the first of its magnitude in 15 years – attracted 45 scientists, researchers, university professors and industry representatives from Canada and the United States to the Great Lakes Forestry Centre November 19-20, 2014. The workshop facilitated knowledge and information exchange and provided a venue for developing future research directions.*

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Collaborative research on forest ecosystem impacts has been ongoing at the Turkey Lakes Watershed (TLW) for the past 35 years. The purpose of the workshop was to provide overviews, summaries and syntheses of past, current and on-going research at the TLW and to discuss future directions in terms of the role that the research done at TLW will have in advancing forest ecosystem science and policy in the coming decades.

Presentations covered five main themes: 1) Trends in atmospheric pollution and climate; 2) Ecosystem response to acidic deposition and a changing climate; 3) Impacts of human activities on ecosystem structure and function; 4) Cumulative effects of human activities on ecosystem services; and 5) The contribution of TLW to our understanding of broad scale ecosystem services.

TLW is an integrated and interdisciplinary long-term ecological research site that has proven to be an excellent example of an integrated systems approach to study natural and anthropogenic effects, forest change and cumulative effects of ecosystem stressors across scales.

The Workshop abstracts and outcomes will be published as a CFS Information Report at a future date.

## TLW researcher retires

### Overview

*Dr. Fred Beall was team leader for GLFC's soil and water group and one of the principal research scientists for the TLW.*

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Fred chaired the interdepartmental Turkey Lakes Watershed Steering Committee and studied the effects of forest harvesting on the hydrology of the TLW. He joined the Canadian Forest Service (CFS) in 1988. Over his career, he studied tree seedling ecophysiology, forest hydrology and biogeochemistry and, most recently, reclamation of forest ecosystems after oil sands mining. He received a CFS Merit Award for Outstanding Leadership prior to his retirement in November 2014. More details about [his research](#) at TLW can be found in Frontline Express Notes [#54](#) and [#76](#).

## Another successful Forest Pest Management Forum

### Overview

*The 57<sup>th</sup> annual Forest Pest Management Forum held in Ottawa, Ontario, December 2-4, 2014, was a big success. The meeting was hosted by Natural Resources Canada (NRCan) and attracted forest pest managers, scientists and practitioners from across Canada and the US to discuss current issues.*

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Forest pest reports that outlined the status of current pests of concern were given by representatives from provincial, territorial and US agencies. Other presentations included updates on regulatory issues, insect semiochemistry research and spruce budworm response strategies. Eleven researchers from NRCan made presentations including two from the Great Lakes Forestry Centre (GLFC): Dave Kreutzweiser and Jeremy Allison.

Dave Kreutzweiser gave a presentation entitled, "When regulatory process and operational requirements conflict: how can we move this forward?" This discussion pointed out that Canada has a rigorous forest pesticide regulatory system and decisions must follow a standardized process to ensure consistency, thoroughness and fairness. However, that process can take time and some emerging pest management challenges can be urgent, time-sensitive and economically significant. Dave proposed solutions to these challenges including fostering increased interaction/information exchanges amongst regulators, researchers and industry; considering the trade-offs of the risk of using pesticide versus the ecological and economic impacts of the pest; and encouraging a more expeditious approach to addressing emerging or urgent issues that pose significant threats to Canada.

Jeremy Allison's presentation "The impact of trap design and the distance among traps on the capture of Cerambycidae" discussed how pheromones and other semiochemicals are effective tools to enhance detection of longhorn beetle species (including the invasive, brown spruce longhorn beetle) in survey traps. He also showed how the optimal trap design varies among longhorn beetles and how early detection is critical to successfully eradicate, contain or manage these pests.

## Sault Ste. Marie hosts SERG International meeting

### Overview

*The 2015 Spray Efficacy Research Group International (SERG-I) workshop was held in Sault Ste. Marie February 2<sup>nd</sup>-5<sup>th</sup>. The workshop is held annually to showcase the research that has been funded over the previous year. The primary aim is to improve pest management methods associated with integrated forest pest management.*

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Over 70 attendees came from across Canada and the US, representing federal and provincial governments, universities, industry, and consultants and others interested organizations. SERG provides a means for the members to work cooperatively on research projects through the sharing of their expertise and resources. Four GLFC scientists and two Canadian Wood Fibre Centre staff gave presentations at the workshop.

Denys Yemshanov spoke on “Planning cost-effective surveillance of alien invasive pests - New approaches to deal with uncertainty and tight budgets.” Surveillance planning relies on probabilities of pest arrival and estimates of spread rates, but when knowledge of a new pest’s behaviour is poor and resources are limited, traditional surveys may not be effective. Denys presented a new survey planning methodology that shows more stable performance under tight budgets and offers a workable strategy for dealing with typical uncertainty. He illustrated its use by analysing pathways of the spread of the emerald ash borer with infested firewood that may be carried by visitors to campgrounds in central Canada and the US. Further information on this topic can be obtained from the [journal article](#) or the GLFC [webinar site](#).

Kees van Frankenhuyzen gave a talk on the effects of Mimic® on spruce budworm. Mimic® is an insect growth regulator that works by inducing premature moulting, and which has been used by some provinces for control of spruce budworm since the mid-1990s. The study Kees presented shows that Mimic is not only effective at killing spruce budworm larvae, but it also kills many of the pupae that are produced by larvae that survived exposure; reduces mating success of surviving adults; and causes the females that do mate successfully to lay far fewer eggs. And all this happens at very low concentrations of Mimic® on the foliage: a quadruple whammy that is too much for the budworm.

Daniel Doucet presented a paper on “RNAi-based pest control products: principles, development and potential applications in forestry”. RNA interference (RNAi) is a phenomenon by which genes can be “silenced” using molecules of double-stranded RNA. Early experiments demonstrated that RNAi can be redirected to silence essential genes in insects and induce lethal effects, leading to potential application in the field against pest species. Daniel presented this new technology and examples of RNAi-based pest control strategies currently in development. He also presented issues regarding efficacy, registration and the potential need to manage insect resistance against RNAi. Finally he reported on the latest results on the design and testing of RNAi-inducing molecules against the spruce budworm, emerald ash borer and gypsy moth.

Chris MacQuarrie discussed his work on “Improving predictive models of forest tent caterpillar outbreak dynamics”. He presented preliminary results from experiments investigating the role of early instar mortality on forest tent caterpillar population dynamics and disease incidence on flight dispersal. The presentation reported work in Quebec, Ontario and Alberta where the same design was replicated simultaneously to look at the effect of different forest types on mortality and disease. More details on this topic can be found in [Frontline Express #68](#).

Two CFS Fibre Centre staff also made presentations. Doug Pitt, scientist with the Canadian Wood Fibre Centre, gave a presentation entitled “Using our research to dispel myths about vegetation management”. Forest managers are often criticised by the public and other interest groups for undertaking measures to control vegetation that is competing with regenerating conifers for sunlight, soil moisture and nutrients. It is important that all practitioners be aware of the science that underpins the legitimacy of the tools that are used. Doug drew upon examples of this research, much of which was sponsored by SERG-I, to dispel many of the arguments and myths that surround this issue. He recently co-authored a series of papers on vegetation management that were published in a [special issue of the Forestry Chronicle](#). A technical note on [“Answers to Frequently Asked Questions \(FAQs\) on the Use of Herbicides in Canadian Forestry”](#) is also available from GLFC. Michael Hoepting, research forester with the Canadian Wood Fibre Centre, gave a presentation entitled: “What we've learned about white pine silviculture from 20 years of research”. White pine is an important commercial species in Ontario. Regeneration of this valuable species, however, is challenging. Partial-harvest systems (e.g., shelterwood) have been viewed over the past 30 years as the most appropriate approach for balancing light and competition levels with growth, but silviculture intervention is frequently required to ensure success. Three long-term studies were referenced to highlight the effects of light, site preparation, vegetation control and planting on stand regeneration success.

### **Technical Note on hemlock woolly adelgid available**

#### *Overview*

*Detailed information about hemlock woolly adelgid (HWA), which was discovered for the first time in southern Ontario in 2012, is now available in [Technical Note #114](#).*

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The presence of white woolly masses on the underside of hemlock twigs is a sure sign that trees are infested. Heavily infested trees will exhibit yellowing of foliage, needle loss and dieback of new shoots; affected trees will look greyish green from a distance and have thinning crowns. Once significant dieback occurs and trees become stressed, they are susceptible to other pests such as the hemlock borer or root disease. In the US, HWA has resulted in greater than 90% mortality of infested trees.

Attempts to eradicate the new populations have been carried out by the Canadian Food Inspection Agency within weeks of their discovery. How long this strategy will remain operationally feasible is unknown. Hemlock is considered a foundational species, particularly in riparian areas, where it creates a unique ecosystem structure. Invasion of hemlock stands by HWA may cause a series of changes that would ultimately affect the structure and function of this distinctive ecosystem.

Further research is needed to improve survey tools to detect and delimit populations and determine rate of spread. It will also be important to assess and adapt various existing means of HWA control for use in Canada: biological, chemical and cultural controls that have shown efficacy against HWA in the US.

## **Presentation on the Sustainable Forestry Initiative (SFI) standard of Forest Certification**

### *Overview*

*Mike Maxfield of Resolute Forest Products and Chair of the Central Canada SFI Implementation Committee visited GLFC to give a presentation about forest certification that highlighted the important link between certification and research.*

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The new SFI [2015-2019 Forest Certification Standard](#) has recently been released. Mike outlined the steps involved in the certification of forest products, which he equated to the “social license” for sustainable management of Canada’s forest resources. SFI is one of three volunteer standards currently in use in Canada, the other two being Forest Stewardship Council (FSC) and the Canadian Standards Association (CSA). All systems assure consumers that certified forest products are from responsibly managed forests. Currently only 5% of the world’s forests are certified, 40% of which are in Canada.

Research is one of the 14 principles that guide the SFI certification. GLFC scientists are well positioned to contribute meaningful research results that can be used to show that forest management is based on sound science. Director General of GLFC David Nanang has signed an acknowledgement of ongoing co-operation that recognizes the shared interests and spirit of cooperation between the two organizations.

Some of the GLFC research projects are of particular interest because they relate to forest harvesting. For example, investigations are ongoing into many aspects of forest sustainability as it relates to biomass removal and biomass retention. In addition, a suite of easily-tracked indicators is also being tested for determining whether the ecological integrity of a forested ecosystem is maintained following disturbances such as wildland fire, insect infestations and forest harvesting.

## **Webinar Report: The Canadian National Vegetation Classification**

### *Overview*

*On November 18, 2014 Ken Baldwin gave a webinar entitled “A new classification of boreal forests in Canada: an update on the Canadian National Vegetation Classification”. Ken gave a talk on the progress of the Canadian National Vegetation Classification and how the Canadian Forest Service is contributing to this important project so that we are “speaking the same language” when it comes to classification of forest types.*

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The Canadian National Vegetation Classification (CNVC) is a nationally standardized, hierarchical classification of vegetation for Canada. The organization of the CNVC hierarchy reflects primary ecological factors that influence vegetation patterns at a range of scales, from site-scale edaphics to global-scale climate. The Canadian Forest Service is coordinating the forest component of the CNVC, using data and professional expertise provided by the provinces and territories. Recently, the first nationally standardized classification of boreal forests for Canada was confirmed. This presentation introduced the new classification, with an emphasis on diagnostic criteria and classification principles for different levels of the boreal hierarchy. An understanding of the diversity of boreal forests in Canada will emerge, and potential applications for this ecological information framework were discussed.

**Webinar Report: Quantifying fire behaviour using infrared remote sensing***Overview*

*On January 20, 2015, Josh Johnston gave a presentation about his innovative fire research. Will it be possible to study wild fires in the future without putting a foot on the ground? Josh explained how his current work may one day lead to that scenario.*

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Fire Radiative Power (FRP) is the rate of radiant energy released from a fire; it can be measured with an infrared detector (handheld, airborne or satellite based). Operational satellite-based detectors such as MODIS routinely measure FRP from active fires all over the world every few hours. The time integral of FRP over the life of a fire (the Fire Radiative Energy [FRE]) is an excellent predictor of biomass consumption and therefore of emissions from fire. However there is much more that can be learned from this measurement of a fire's power and total energy release. The interest in the greater potential of FRP has been the basis of an international collaboration between CFS and King's College London (UK). Numerous joint field campaigns have been undertaken in this collaboration for the purposes of investigating how FRP and FRE relate to the full energy budget and dynamics of wildfires. These studies have led to novel methods of measuring fire intensity and rate of spread (i.e., fire behaviour) from FRE based analysis. A discussion of the experimental process, algorithm development and the implications of this work were presented. The slide presentation and audio recording for both webinars will be posted for download at <ftp://ftp.nrcan.gc.ca/cfs/glfc/>. All previous Webinars are also archived there.