Institut de recherche sur les feuillus nordiques Inc.
Northern Hardwoods Research Institute Inc.

THE LEAFLET
NHRI's Monthly Newsletter
May 2019
Volume 1, Issue 1

# THE LEAFLET
## Presenting NHRI's Monthly Newsletter

Established in 2012, the Northern Hardwoods Research Institute (NHRI) is an innovative partnership between the private forest sector, governments and academia. It is situated in Edmundston, New Brunswick and was created out of a need to conduct applied research to provide immediate solutions for the sustainable and feasible management of northern hardwood forests. Since its inception the NHRI has developed solid partnerships and managed to put together an amazing team formed of academics, foresters, technical staff and students. Since opening its doors, the NHRI has evolved and progressed in leaps and bounds. Initially the focus was on developing the knowledge and the science behind the management of northern hardwood forests; while keeping a laser sharp focus on the fact that our research always had to have an end user. These initial efforts in applied forestry led to the production of several useful forest management tools. Most of these tools have now been integrated in the management practices of our industry and government partners.

During the last few years much energy and resources were put into transferring the knowledge developed at the NHRI to our industry and government partners. Particular attention was given to showcasing, testing and recommending cutting edge forest management tools. Our team worked hard to organize conferences, workshops, training sessions, develop best practices and standard operating procedures and made sure that all stakeholders involved had the right data and tools to make informed decisions. Thus, the second phase of the NHRI had begun and our in-house team was transitioning from knowledge creators to knowledge mobilizers. Simultaneously the NHRI began developing solid partnerships with several academic institutions. While our foresters and technicians were busy working in the field with industry and government partners our researchers were establishing a beach head for the NHRI as a very useful place for academics to access field data and real-life industry issues; more commonly known in academic circles as amazing research questions.

Today the NHRI is well positioned and our place in the forest management ecosystem is clearer than ever before. By continually working directly in the field our team essentially plays the pivotal role of linking the needs of stakeholders with available knowledge; and turning to our academic partners when the right tools have yet to be developed. Over the course of the last few years we have been able to position ourselves as a knowledge broker of sorts. This position in the ecosystem has allowed our team to find the best solutions for our clients while also playing an important role in the development of new knowledge applicable to the management of hardwood forests.

As we become more comfortable in this new role, we realize that as knowledge mobilizers and brokers it is essential that we equip ourselves with better communications pipelines that will allow us to share our team's, and our partners, passion for hardwood forest management. Over the course of the coming months you should hear from us more often as we aim to share results, stories from the field, success stories, and much more through this newsletter, social media and our website. With this in mind, we are very happy to present the first edition of the NHRI Leaflet… we hope you will enjoy it!

POINTS OF INTEREST INSIDE THIS ISSUE

**How well can OSM (Open Stand Model) predict tree recruitment in the Acadian Forest Region of North America?**

A key question for forest stakeholders in NB is how well OSM, a tree-list growth model calibrated for the Acadian Forest Region, can predict the recruitment of new stems with a DBH equal or above 5 cm over a 9-10 year period (hereafter "ingrowth"). By working collaboratively with one of our research partners, the K.-C. Irving Research Chair in Environmental Sciences and Sustainable Development, we've started answering this question in a study.

We used data from 97 unharvested permanent sample plots (PSP) of 0.05 ha obtained from the JD Irving-AMA database (hereafter PSP-JDI-AMA). PSP-JDI-AMA are situated in the Black Brook Forest District, owned by J.D. Irving, Limited, in northern New Brunswick, Canada. These plots were surveyed initially in 2002 or 2003 and then in 2013.

For sugar maple, more observed ingrowth in permanent sample plots corresponds to more predicted ingrowth by OSM. Yet, OSM underestimates ingrowth: when 100 new stems were recruited (DBH class ≥ 5 cm) only 1.75 new stem was predicted by OSM. (Figure 1)

For American beech, more observed ingrowth in permanent sample plots corresponds to more predicted ingrowth by OSM. Yet, OSM underestimates ingrowth: when 100 new stems were recruited (DBH class ≥ 5 cm) only 0.5 new stem was predicted by OSM. (Figure 2)

* We are grateful to J.D. Irving, Limited for sharing the valuable dataset used in this study (JDI-AMA) and to David MacLean's team of the University of New Brunswick for the establishment and remeasurement of studied plots.

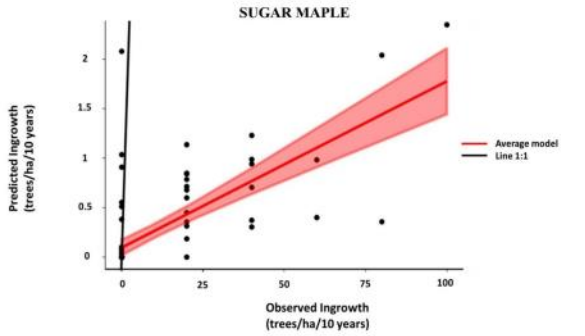


**Figure 1:** Increase in predicted ingrowth as a function of observed ingrowth (trees/ha/10 years) for sugar maple (n=97 plots).

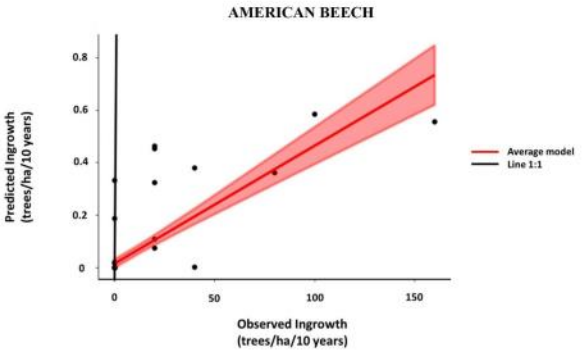


**Figure 2:** Increase in predicted ingrowth as a function of observed ingrowth (trees/ha/10 years) for American beech (n=97 plots).

Photo 1: Poorly regenerated hardwood stands.

Photo 2: Prolific maple regeneration following a 2-aged silviculture treatment.

*Pamela Hurley Poitras — Silviculturist and drone pilot at the NHRI*

## PEOPLE IN THE SPOTLIGHT
## Pamela Hurley Poitras

On most days Pamela Hurley Poitras can be found working in a hardwood forest with her boots firmly on the ground and her eyes focused towards the sky! When Pam isn't in the forest flying a drone or taking measurements, she can probably be found transferring knowledge and management tools to foresters, technicians and contractors. If by chance you do catch her in front of a computer screen, odds are its winter, and she's probably interpreting, filtering or plotting forest data. Either way, her days are essentially spent working on advancing our knowledge of hardwood forest management or ensuring that stakeholders have access to the right information and tools required to make enlightened decisions.

Pamela has 25 years of applied forestry experience. Before joining our team at the NHRI Pam worked as a technician for the Ministère des Ressources naturelles et de la Faune du Québec, as a team leader in forest inventory for Cyr Forest Development and as a supervisor in forest inventory, operations, research and development at J.D. Irving Ltd for 7 years.

Pam joined the NHRI team in 2013 and she has played a pivotal role in our organization ever since. She is often relied upon as the link between applied field knowledge, industry partners, cutting edge technology and our research team; a forest management Rosetta Stone of sorts. Since joining our team Pam has worked on a wide variety of projects from detecting change in canopy structure using 3D modeling, to creating HD inventory in the McCoy Brook area and investigating the use of remote sensing for regeneration characterization. To say that she has kept herself at the cutting edge of technology when it comes to forest management would be an understatement.

One thing is certain about Pam and that is that she is very passionate about what she does. "I love working in the forest. I really like working with our industry partners and I've always had a strong penchant for technology… so basically I really enjoy my job!" That is music to our ears Pam since we hope you'll be a NHRI team member for many years to come!

*"I love working in the forest. I really like working with our industry partners and I've always had a strong penchant for technology… so basically I really enjoy my job."*

## Examining the Multi-Seasonal Consistency of Individual Tree Segmentation on Deciduous Stands Using Digital Aerial Photogrammetry (DAP) and Unmanned Aerial Systems (UAS)

**Journal:** Remote Sensing (www.mdpi.com/journal/remotesensing)

**Citation:** Remote Sens. 2019, 11, 739; doi:10.3390/rs11070739

**Published:** 27 March 2019

**Authors:** Rik J.G. Nuijten[1] (rik.nuijten@alumni.ubc.ca); Nicholas C. Coops1 (nicholas.coops@ubc.ca);Tristan R.H. Goodbody1 (goodbody.t@alumni.ubc.ca) and Gaetan Pelletier[2] (gaetan.pelletier@hardwoodsnb.ca).

1 – Faculty of Forestry, University of British Columbia (T.R.H.G.)

2 – Northern Hardwoods Research Institute Inc. (NHRI)

**Keywords:** digital aerial photogrammetry; unmanned aerial systems; individual tree extraction; tree metrics estimation; seasonality; forest inventory; airborne laser scanning; forest management.

**Abstract:**

Digital aerial photogrammetric (DAP) techniques applied to unmanned aerial system (UAS) acquired imagery have the potential to offer timely and affordable data for monitoring and updating forest inventories. Development of methods for individual tree crown detection (ITCD) and delineation enables the development of individual tree-based, rather than stand-based inventories, which are important for harvesting operations, biomass and carbon stock estimations, forest damage assessment, and forest monitoring in mixed species stands. To achieve these inventory goals, consistent and robust DAP estimates are required over time. Currently, the influence of seasonal changes in deciduous tree structure on the consistency of DAP point clouds, from which tree-based inventories can be derived, is unknown. In this study, we investigate the influence of the timing of DAP acquisition on ITCD accuracies and estimation of tree attributes for a deciduous-dominated forest stand in New Brunswick, Canada. UAS imagery was acquired five times between June and September 2017 over the same stand and consistently processed into DAP point clouds. Airborne laser scanning (ALS) data, acquired the same year, was used to reconstruct a digital terrain model (DTM) and served as a reference for UAS-DAP-based ITCD. Marker-controlled watershed segmentation (MCWS) was used to delineate individual tree crowns. Accuracy index percentages between 55% (July 25) and 77.1% (September 22) were achieved. Omission errors were found to be relatively high for the first three DAP acquisitions (June 7, July 5, and July 25) and decreased gradually thereafter. The commission error was relatively high on July 25. Point cloud metrics were found to be predominantly consistent over the 4-month period, however, estimated tree heights gradually decreased over time, suggesting a trade-off between ITCD accuracies and measured tree heights. Our findings provide insight into the potential influence of seasonality on DAP-ITCD approaches to derive individual tree inventories.

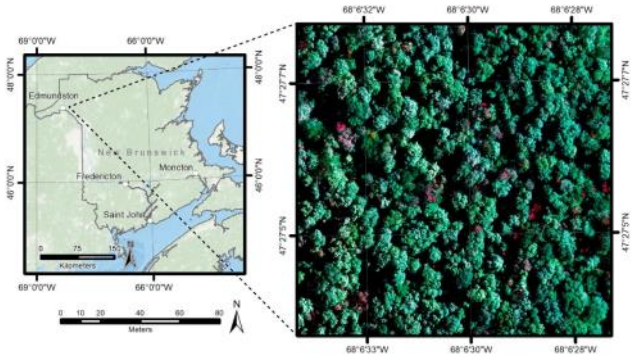


**Figure 1.** Study area near Edmundston; an orthophoto of 25 July 2017 is displayed in a false color composite of red, green, and near-infrared. Both maps are projected in WGS 84/UTM zone 19N.

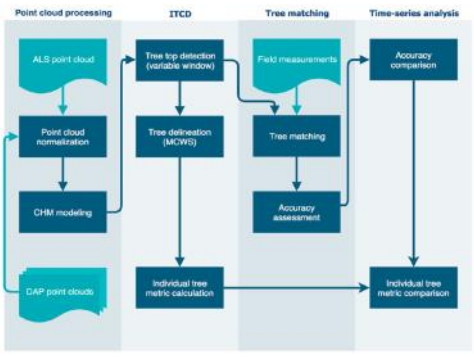


**Figure 2.** Conceptual workflow detailing the methodological process used for point cloud processing, individual tree crown detection and delineation (ITCD), tree matching (accuracy assessment), and time-series analysis.

# PROMISING PARTNERSHIP

## K.-C.-Irving Research Chair in Environmental Sciences and Sustainable Development

UNIVERSITÉ DE MONCTON
EDMUNDSTON MONCTON SHIPPAGAN

**Chaire de recherche K.-C.-Irving en sciences de l'environnement et développement durable**

Established by the Conseil des gouverneurs de l'Université de Moncton at its meeting of September 25, 1993, the K.-C.-Irving Research Chair in Environmental Sciences and Sustainable Development has a mandate to develop and transfer knowledge on issues related to the protection of natural resources and the environment in a context of sustainable development. The Chair is attached to the Faculté des sciences and is also affiliated with Maîtrise en études de l'environnement where it also has an office and conducts research.

According to the Chair holder, professor Marie-André Giroux, her research team has several objectives that all gravitate around sustainable development. Professor Giroux's vision is very clear: " we aim to develop and implement a world-class research program in line with the Chair's mandate."

In March 2018 the NHRI and the Université de Moncton signed a memorandum of understanding, thus establishing a framework from which a research partnership could be built between both organizations. This led to the signing of the first research contract between the NHRI and the K.-C.-Irving Research Chair in Environmental Sciences and Sustainable Development in October 2018.

The partnership has since proven very strategic and fruitful for both partners. Professor Giroux's team are currently working on several projects collaboratively with the NHRI team. The research agenda essentially revolves around better understanding regeneration in hardwood and mixed stands. More specifically both teams are working together to develop a model for regeneration dynamics of seedlings/saplings and their promotion into commercial class sizes.

According the Gaetan Pelletier, Executive Director of the NHRI, "the partnership between both research teams is a great match. Our work in the field allows us to identify practical and timely problems related to the management of the resource. We can then count on the Chair's expertise, knowledge and resources to help us find solutions to these problems. Professor Giroux's team receives a constant flow of real-life research questions and we get to leverage more brain power to find solutions and develop tools to better manage the hardwood resource."

From what we have seen so far the research partnership between both institutions is very promising. During the last year we have only begun to scratch the surface of what is possible in terms of actionable results. Stay tuned to find out what is coming next…

*"Professor Giroux's team get a constant flow of real-life research questions and we get to leverage more brain power to find solutions and develop tools to better manage the hardwood resource."*


**NHRI-IRFN**

165, boulevard Hébert
Edmundston, N.-B.
E3V-2S8

Phone: 1-506-737-4736
Fax: 1-506-737-5373
E-mail: info@hardwoodsnb.ca

**www.hardwoodsnb.ca**


# UPCOMING EVENTS

## Workshop: NHRI Silviculture Prescription System

### Implementing the NHRI's tools on NB Crown Licenses #1 and #8

On Wednesday, May 15th the NHRI team will be delivering a workshop for employees of AV Group, Groupe Savoie and the New Brunswick Department of Energy and Resource Development. Approximately 25 people (foresters, technicians and managers) are expected for this full day workshop.

Attendees will learn about the Silviculture Prescription System and how to apply it operationally.

## Workshop: Bucking for Value

### Strategies for optimizing saw log recovery

On Thursday, May 23rd the NHRI team will be animating a full day workshop organised jointly by the Madawaska Forest Products Marketing Board (MFPMB) and the UMCE School of forestry (École de foresterie de l'UMCE). The workshop is aimed at woodlot owners and contractors that operate in the MFPMB's territory and will be interactive; with demonstrations and activities. The main objective will be to showcase strategies to optimize the bucking of hardwood for higher saw log recovery. Attendees will also learn about tree classification and how to recognize external defects and predict the impact on wood quality.

Those interested in attending the workshop must register with the MFPMB via e-mail (odvdm@nbnet.nb.ca) or by phone 506-739-9585.

The workshop is free, and lunch is included!

Participants must bring their own security equipment (boots, vest, hardhat and safety glasses).

**ATELIER - TRONÇONNAGE - BOIS FRANC**

Pour les propriétaires de boisés privés et entrepreneurs qui opèrent sur le territoire de l'Office de vente du Madawaska

OFFICE DE VENTE DU MADAWASKA

**DATE** Jeudi 23 mai 2019 **HEURE** 9h à 16h

**Inscription obligatoire** auprès de l'Office de Vente 739.9585 ou odvdm@nbnet.nb.ca

**Places limitées!** Activité gratuite et dîner inclut (Merci aux partenaires financiers!)

**Apportez votre équipement de sécurité** (bottes, veste, casque et lunettes)

**Objectifs** - optimiser le façonnage des produits, découvrir les possibilités, maximiser la valeur, réseauter avec divers intervenants, discuter des pratiques d'aménagement durable en forêt feuillue!

**ANIMÉ PAR**

Institut de recherche sur les feuillus nordiques Inc.
Northern Hardwoods Research Institute Inc.

**PARTENAIRE ORGANISATEUR**

UNIVERSITÉ DE MONCTON CAMPUS D'EDMUNDSTON
École de foresterie

**PARTENAIRES FINANCIERS**

BEGIN & BEGIN INC. NBG columbia FOREST PRODUCTS GROUPE SAVOIE TWIN RIVERS PAPER COMPANY