DECEMBER 2019

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NORTHERN HARDWOODS RESEARCH INSTITUTE'S MONTHLY NEWSLETTER

THE LEAFLET

HARVEST KNOWLEDGE, **PROMOTE** GROWTH

NHRI'S WORK PLAN

ONGOING AND UPCOMING PROJECTS FOR 2020

Working towards increasing timber volume and quality in northern hardwoods and mixed forests!

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

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NHRI's 2020 WORKPLAN

NORTHERN HARDWOODS AND MIXED FORESTS

Working towards increasing timber volume and quality...

In this edition of the Leaflet we present our readers with the broadstrokes of our workplan for 2020. At NHRI things move fast and we have a lot of projects on the go, to a point were it can almost be dizzying. Our objective here is to show our readers and stakeholders how all these initiatives, projects and partnerships fit together strategically into a plan that structures how we allocate our resources and dictates how we organize our work.

Before getting into the details of how we do things, its' important to understand why we dedicate so much energy to the initiatives and projects presented in the following pages. The answer to this question is simple; everything we do has to be alligned with our mission, which in a nutshell is, to work with our stakeholders and partners towards increasing timber volume and quality in northern hardwoods and mixed forests. To accomplish this, our team structures its work into two interconnected pillars; knowledge production and knowedge mobilization.

KNOWLEDGE PRODUCTION. ***Mission Oriented Research.*** Since its inception NHRI has always strived towards a mission oriented research model that aims to effectively provide tangible benefits to the forest sector. One of our key operating principles at NHRI is: "no research for the sake of research". Put in a positive way it essentially means that any and all research that is conducted within our walls must be useful and have a well-defined end-user. Research must focus on problem-solving and be undertaken by mixed and flexible team. Quality of the work requires relevance, feasibility and timeliness. In order to implement our strategy of mission-oriented research, we have put in place a model and processes to ensure that our work is focused on bringing solutions to our partners and clients.

KNOWLEDGE MOBILIZATION. ***Making Knowledge Accessible, Useable and Useful.*** The success of NHRI resides in the novel way it mobilizes knowledge for its customers and materializes it into tangible benefits. The goal is to provide user-ready knowledge that improves the financial and silvicultural sustainability of hardwood and mixed wood stands. At NHRI we endeavor to churn out 4 types of knowledge mobilization: Improving - Enabling - Training - Informing. NHRI was essentially created to bring immediate, applicable and field-tested solutions for foresters, contractors, woodlot owners and forest workers with boots on the ground and eyes on the canopy.

MISSION

Our mission is to produce and mobilize the knowledge and tools required by forest stakeholders to manage northern hardwoods and mixed forests optimally; in terms of resource growth, harvest volumes, timber value and long-term sustainability.

NHRI's 2020 WORKPLAN

NORTHERN HARDWOODS AND MIXED FORESTS

Working towards increasing timber volume and quality...

KNOWLEWDGE PRODUCTION

Our knowledge production workplan for 2020 is divided into two major initiatives:

IMPROVEMENTS TO SPS. In order to ensure our tools keep up with the times and the realities of field operations we take a three pronged approach to continuous improvement :

- We develop **solid research partnerships** with other research centers and expert consultants to push our tools to the cutting edge of available knowledge and technology.
- We listen to our clients intently. All our workshops, training and field demonstrations are designed to be a two way conversation acting as simple yet effective **stakeholder feedback loops.**
- We conduct **field trials** that allow us to test our system and acquire data on implementation results.

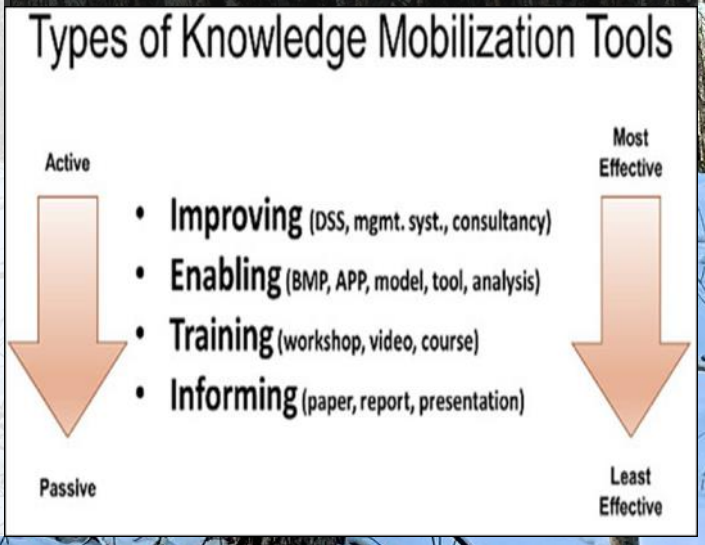
TACTICAL SILVICULTURE PLANNER. This initiative is about creating a suite of technology solutions (modules within a tool box) that is to be made available to forestry professionals for the planning of silviculture of mixed and hardwood stands and forests. The NHRI will lead the development of the tool box and leverage its already existing body of knowledge.

KNOWLEDGE MOBILIZATION

Our knowledge mobilization workplan for 2020 is divided into two major initiatives.

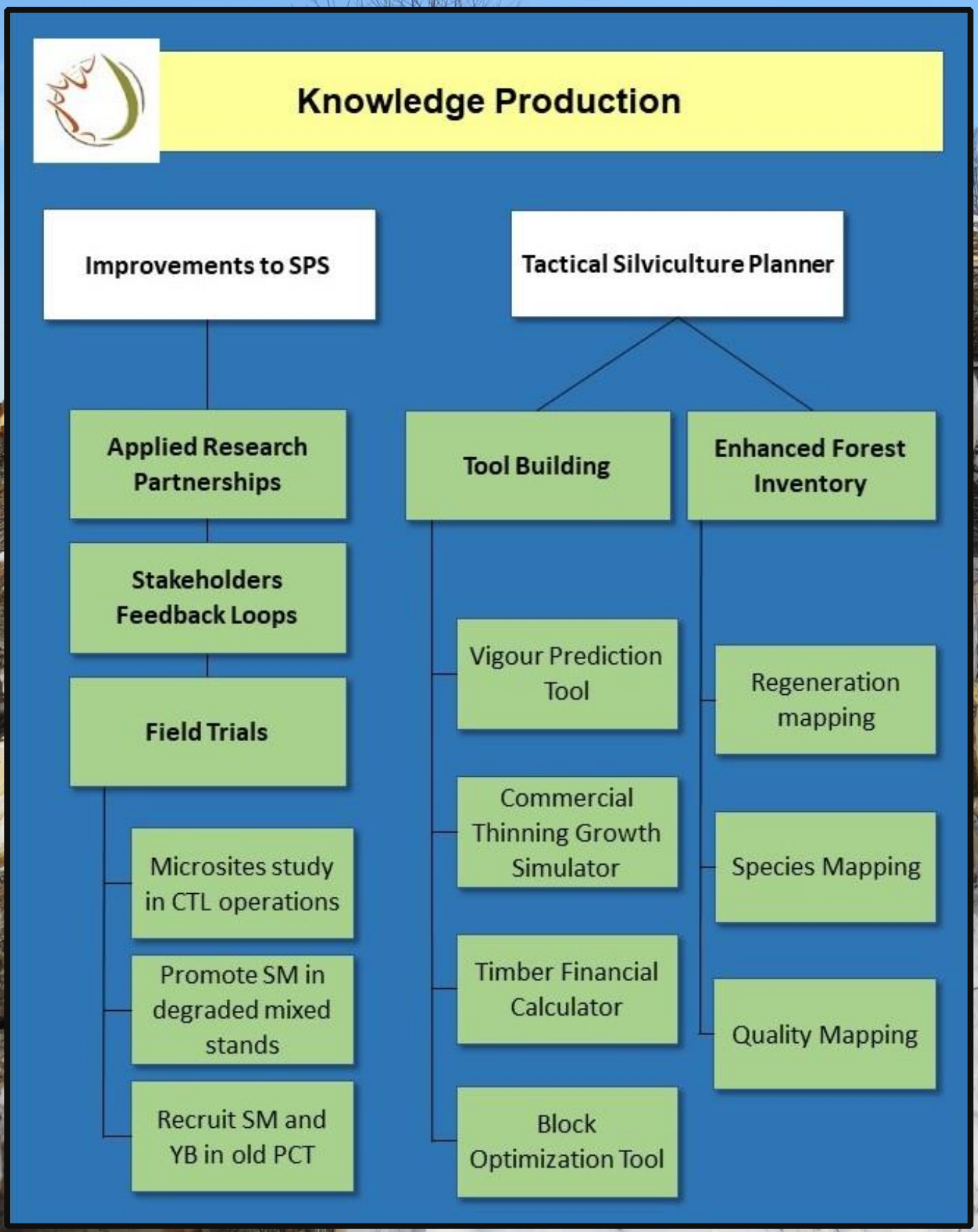
PRECISON BLOCK PLANNING. Our Precision Block Planning initiative leverages many of our tools to provide forest products companies with an all-in-one operational process. Precision inventories that combine field timber cruises with remote sensing are conducted to assign silviculture prescriptions, set harvest productivity, volume and saw log recovery targets. Operational results are then compared to inventory based forecasts in order to ensure follow-up and continuous improvement. This initiative is where we put the beta versions of our tools to the test and get feedback from end-users.

SPS TRAINING. This initiative is multifaceted and organized into several key projects. The objective is to make our revised SPS 2.0 accessible, useable and usefiul to forest managers, forestry professionals, forest workers, woodlot owners and students. In order to accomplish this the NHRI SPS 2.0 will be broken down into 4 types of knowledge mobilization tools:



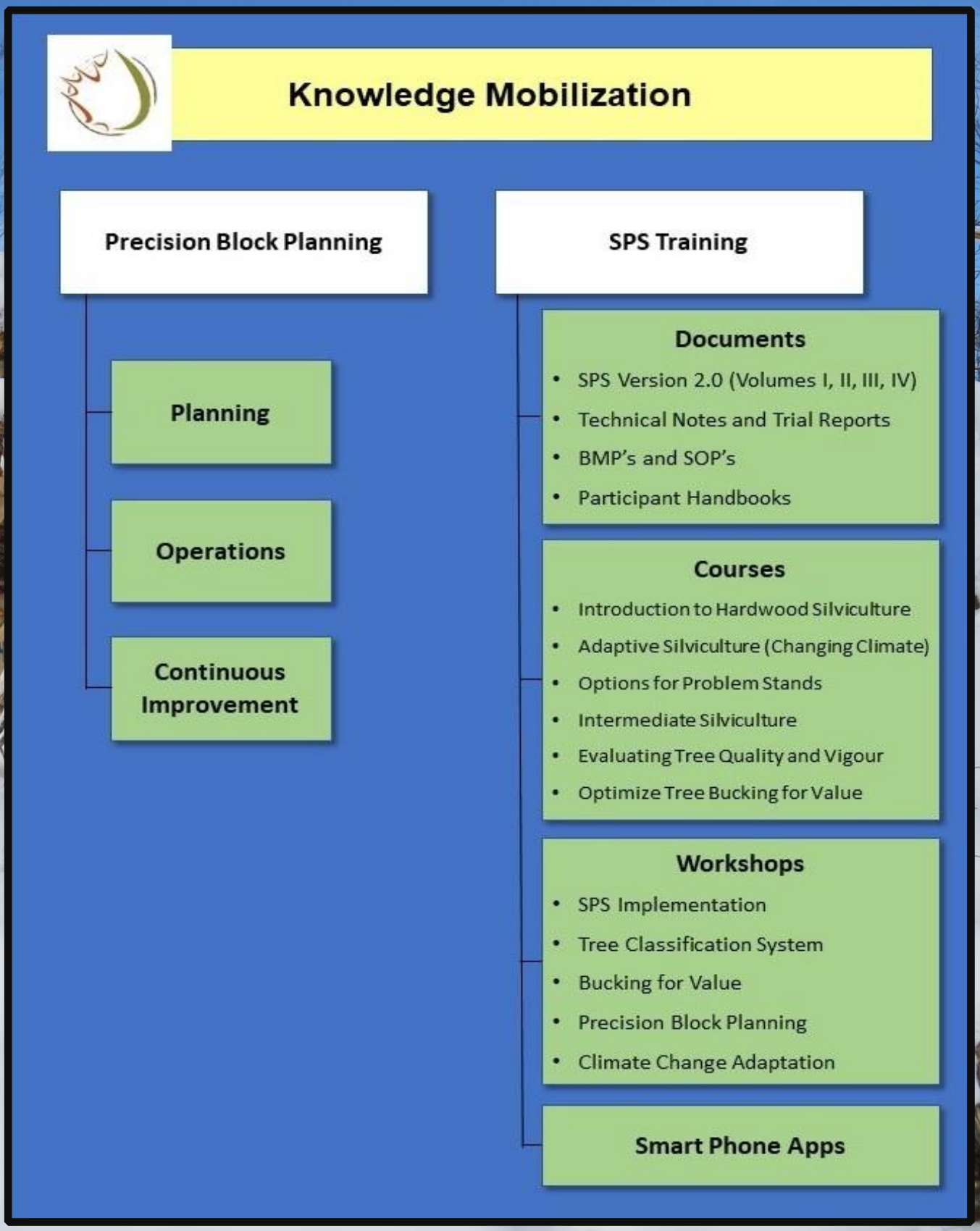
NHRI's 2020 WORKPLAN - KNOWLEDGE PRODUCTION

WORKING TOWARDS INCREASING TIMBER VOLUME AND QUALITY IN NORTHERN HARDWOODS AND MIXED FORESTS!



NHRI's 2020 WORKPLAN - KNOWLEDGE MOBILIZATION

WORKING TOWARDS INCREASING TIMBER VOLUME AND QUALITY IN NORTHERN HARDWOODS AND MIXED FORESTS!



SPS 2.0 - CONTINUOUS IMPROVEMENT

WHY IT'S IMPORTANT TO IMPROVE OUR FLASHIP SILVICULTURE PRESCRIPTION SYSTEM

The **NHRI Silvicultural Prescription System (SPS)** is a five-step method that utilizes the ecological characteristics of the forest (e.g. species composition, stand structure, and regeneration status of desirable species) to recommend silvicultural systems and practices that favor the establishment of desired species. While the NHRI SPS is still relatively new in terms of its application on an industrial scale our preliminary research indicates that it is a very promising tool in our efforts to increase harvest volumes and improve the quality of timber and regeneration in northern hardwood forests.

We are confident that our new innovative approach to northern hardwoods silviculture will bring excellent results; however, it's important not to sit on our laurels. New technologies, changes in operational objectives, silviculture practices, harvest systems and a changing climate are but a few of the reasons why our tools must constantly be evolving and improving.

In order to ensure our tools keep up with the times and the realities of field operations we take a three pronged approach to continuous improvement related to the NHRI's SPS:

- We develop **solid research partnerships** with other research centers and expert consultants to push our tools to the cutting edge of available knowledge and technology.
- We listen to our clients intently. All our workshops, training and field demonstrations are designed to be a two way conversation acting as a simple yet effective **stakeholder feedback loops.**
- We conduct **field trials** that allow us to test our system and acquire data on implementation results .

"New technologies, changes in operational objectives, harvest systems, silviculture practices, and a changing climate are but a few of the reasons why our tools must constantly be evolving and improving."

NHRI'S SILVICULTURE PRESCRIPTION SYSTEM

5 STEPS...

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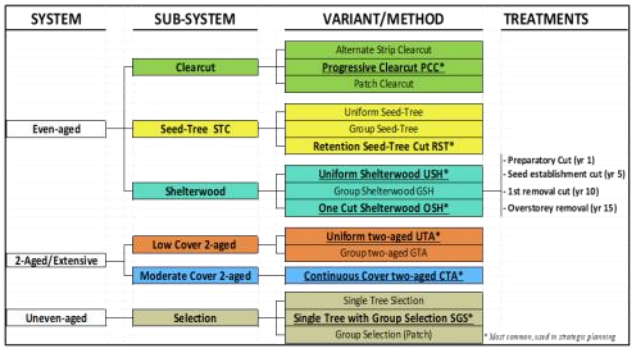
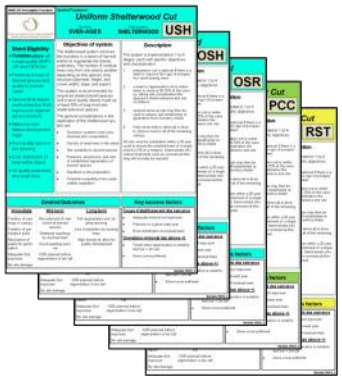
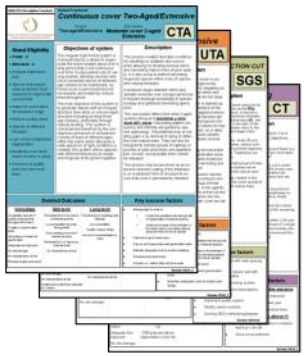
Northern Hardwoods Research Institute Inc.

The NHRI Silviculture Prescription System
5 Steps

Step 1: Get familiar with the systems, sub-systems and their variants

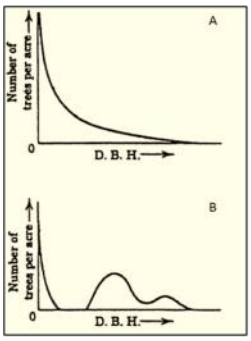




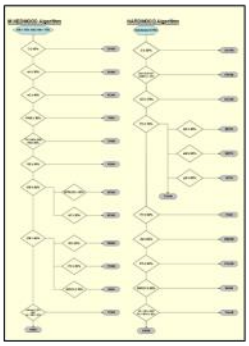


Step 2: Determine the stand type

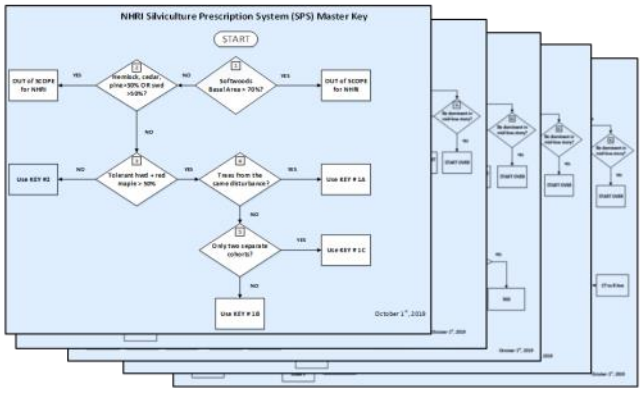
Age class structure



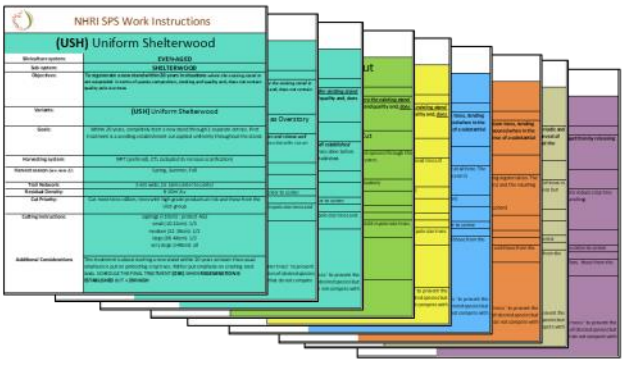
Species composition (FUNA)



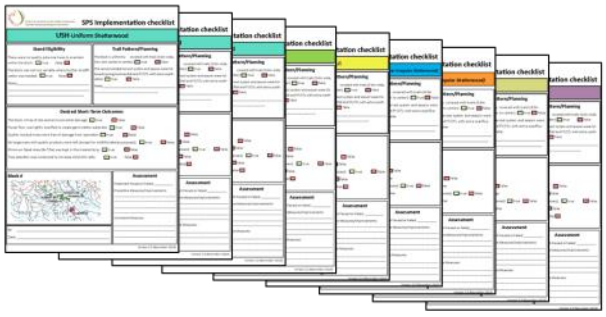
Step 3: Run the treatment determination keys



Step 4: Provide work instructions to supervisors/contractors/operators



Step 5: Set the stage for performance monitoring and management



THE TRIALS AND TRIBULATIONS OF NHRI'S SPS...

HOW WE PUT THE NHRI SILVICULTURE PRESCRIPTION SYSTEM TO THE TEST

In order to keep the NHRI Silviculture Prescription System up to date, and aligned with operational realities on the field, our team endeavours to develop partneships that allow us to test and validate our system through field trials. Every year we put the NHRI SPS to the test with several field trials. For 2020 we have partnered with AV Group NB and the New Brunswick Department of Natural Resources and Energy Development to complete the following trials:

Field Trial #1: Promoting maple in degrated stands

This trials' objective will be to test the ability of various treatments to promote maple in degraded mixed stands with intolerant hardwoods. To do this our Precision Silviculture Team (PST), lead by Pamela Hurley Poitras, will establish side-by-side operational demonstrations on New Brunswick Crown Lands License #1. While the trial will be established in 2020 long-term follow-up protocols will also be implemented so that we can follow growth and quality results on a yearly basis and adjust prescriptions accordingly. Best management practicies for this type of stand will also be developped and made available in 2021.

Field Trial #2: Recruiting maple and yellow birch in old PCT Stands

Through this trial our team will be trying to set the stage for establishment of multiple cohorts in otherwise even-aged stands when commercial thinning treatments do not by themselves create such cohorts. In order to accomplish this our Precision Silviculture Team will be setting up test plots with various treatments in stands that were pre-commercially thinned in the 1990's. The central objective of the trial will be to identify the best treatments to recruit sugar maple and yellow birch in old PCT stands.

THE TRIALS AND TRIBULATIONS OF NHRI'S SPS...

FIELD TRIAL #3: EFFECTS OF CUT TO LENGHT AND FULL TREE HARVESTING ON REGENERATION

Cut-to-length and full-tree are common harvesting systems in the hardwood stands of New Brunswick. These harvesting systems have varying effects on the forest floor, which may affect the success of natural regeneration. However, studies quantifying the impacts of these harvesting methods on seedbed quality and regeneration establishment are generally limited.

Cut-to-length harvesting is thought to be the more economical option for harvesting since delimbing, bucking, sorting, and piling are all done at the stump. There are fewer steps required, thus reducing the number of equipment needed. However, cut-to-length harvesting generates significantly more slash in cut blocks than full-tree harvesting. This has led to concerns about the impact of the slash on forest regeneration. The complete removal of slash in full-tree harvesting also has the potential to damage advanced regeneration and increase exposure-related stress and mortality of advanced regeneration.

The influence of these harvesting methods on conifer regeneration are widely studied, but less so in hardwood stands. Natural regeneration of Yellow Birch could prove particularly problematic due to the post-harvest effects of these methods on potential seedbeds. Therefore, it is worth investigating the most commonly used harvesting methods in hardwood stands.

Proposed Methodology

Thirty-six blocks (60 m x 90 m each) within NB license 1 and 9 will be selected for this study. The blocks will be at least 300 m apart to minimize local site effect. Each harvest method (HM) will have years since the last harvest (TSLH) ranging from 2 to 10 years, and 2 replications for each year. Within each block, six circular plots (1.46 m radius) will be randomly established to measure Yellow Birch regeneration ≥30 cm and ≤ 130 cm in height. Within the circular plot, all regeneration will be tallied in four height classes: 30- <55cm, 55 -<80 cm, 80 - <105 cm, and 105 - < 130 cm. The pre- and post-harvest block conditions will be used to estimate the harvest intensity (basal cut). Harvest intensity estimation will be limited to only merchantable trees (trees ≥ 10 cm dbh). Additionally, topographic (elevation, slope) and edaphic (soil type, bed rock) parameters will be obtained for each circular plot. Yellow Birch regeneration density between the two harvesting methods will be analyzed using one-way ANOVA with repeated measure at a significant level of 0.05.

Project goals & objectives

- Understand the effects of cut-to-length systems on post-harvest Yellow Birch regeneration recruitment.
- Assess the effects of cut-to-length on seedbed quality.
- Assess the influence of cut-to-length on regeneration establishment.
- Determine the regeneration dynamics (establishment, survival and growth) following CTL harvest operations.

THE TRIALS AND TRIBULATIONS OF NHRI'S SPS...

AV GROUP NB: A RELIABLE PARTNER FROM DAY ONE.

Av Group NB is a founding member and supporter of the Northern Hardwoods Research Institute. The company applies the knowledge which it learns from the science developed at NHRI to their forest management plans. This ensures that their team is using the best science in their decision making on how to manage their forests.

More importantly the company and its team have proven to be reliable partners in terms of granting access to the lands they manage and have proven time and again that they are willing to devote time, energy and resources in order for our team to test and develop our tools. AV Group NB have actively participated in many initiatives launched by NHRI and have always supported our team in the accomplishment of our mission.

Collectively, AV Group NB manages over 1.6 million acres of company -owned and public (Crown) land under two New Brunswick Crown licenses. AV Group NB is active in silviculture and the management of the forests for other uses including maple sugar, camping, waterway buffers zones, and the preservation of wildlife habitat. AV Group NB's operations are 3rd Party certified with the Sustainable Forestry Initiative® (SFI), the world's largest single forest certification standard by area.

AV Group NB is a member of the India-based Aditya Birla Group which has a global workforce of 130,000 employees. As a $40 billion USD company, with operations in 25 countries, Aditya Birla Group is in the league of Fortune 500 companies.

Having such a world class company as a partner and willing to actively participate in our initiatives is a major asset for our team. Gaining AV Group NB's confidence and trust over the years is a great source of validations for our work.

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NHRI'S TACTICAL SILVICULTURE PLANNER

A VALUABLE TOOL FOR FORESTERS!

The last decade has seen major advances in the technology applicable to forest planning and operations. Whether it be improvements in modelling capabilities, the spread of LIDAR data capture, more affordable satellite imagery, the common use of drones, the development of new field useable software like inventory apps, or the more recent advent of AI; the forestry sector has welcomed many new, and constantly evolving, game changing technologies.

While these advances are certainly impressive, there is still much work to do in terms of connecting the dots between them by developing a user friendly platform that capitilizes on what the most effecient of these new tools bring to the table. Futhermore, most of the tools derived from those technologies have been designed for softwood forests and/or plantation management; leaving the more complexe work of adapting theses tools to the management of northern hardwoods and mixed forests underdveloped in many ways.

What is also lacking is the ability to use these technologies to automatically assign a treatment (from the NHRI SPS) to stands and micro-stands using enhanced forest inventories. In a nutshell, that is precisely the vision behind our initiative aimed at developping NHRI's Tactical Silviculture Planner. It will provide recommended treatments at a much finer scale that will only require field validation by experienced professionals for fine tuning.

TOOL DEVELOPMENT.

The initiative is nested within the design of a suite of technology solutions (modules within a tool box) that is to be made available to forestry professionals for the planning of silviculture of mixed and hardwood stands and forests. The NHRI will lead the development of the tool box, put in place the required partnerships, and leverage its already existing body of knowledge.

EFI IMPROVEMENT.

Many of the tools under deveolpment will require improvements to available forest inventory data and/or current modelling frameworks in order to develop or adapt them to the intricacies of hardwoods and mixed forets silviculture. Models are only as good as the quality of the criteria they are built to consider and the accuracy of the data fed into them.

In order to build a Tactical Silviculture Planner that will be effective and reliable in churning out field ready decisional information some imporvements will have to be made in terms of the currently avaialble extensive forest inventory for northeastern North America. For the coming 12 to 18 months our work will focus on three important improvement projects that fall under the following themes:

- **Regeneration Mapping**
- **Species Mapping**
- **Mapping of stand and tree quality**

DEVELOPING NHRI'S TSP: ACCURATE DATA AND EFFICENT TOOLS

ATTACKING ON TWO FRONTS: EFI IMPROVEMENTS AND TOOL DEVELOPMENT

EFI IMPROVEMENTS

Regeneration Mapping. The objectives of this project will be to (1) estimate sapling density of all and commercial species using LiDAR and satellite images and to (2) understand the limits of sapling estimation using remote sensing along a gradient of canopy cover. In order to accomplish this we will develop 3 models using Random Forest and we will evaluate which one produces the most accurate estimation: Model 1: LiDAR metrics / Model 2: Sentinel images / Model 3: LiDAR metrics and spectral variables. We will then test the relative errors (error/actual) of each model per canopy cover category (low to very high) to understand the impact of canopy cover on the models' accuracy.

Species Mapping. Information about species composition is crucial for the planning of forest operations. Currently, the characterization of stand composition relies on less-than-ideal photo-interpretation. Under the current process, the information is coarse, has limited spatial resolution and is not adequate for today's requirement for precision planning tailored to the characteristics of individual micro-stands. The new process will consist of area-based tree species identification from remote sensing data that will include LiDAR metrics as well as modern medium resolution multispectral satellite imagery. We will leverage timing of imagery and spectral information specific to different species. Northern hardwood forests are characterized by large variations in foliage color across seasons, with species following a sequence of leaf development and senescence. This project will capitalize on the timing of these seasonal variations to identify distinctive spectral components for each species. To our knowledge no method has yet been established for the remote identification of our local tree species.

Mapping of tree and stand quality. The objective of this project will be to develop an adaptable model to predict tree quality (AGS/UGS) of hardwood species when risk (vigor) and form are unknown, for various stand conditions. Quality predictability will be considered under two types of parameters: (1) Predicting quality (AGS/UGS) at the stand, plot and tree levels using dendrometric parameters; (2) Predicting quality (AGS/UGS) at the stand, plot and tree levels using remote sensing parameters.

TOOL DEVELOPMENT: INDIVIDUAL COMPONENTS OF THE TACTICAL SILVICULTURE PLANNER

SPS Prescription. Based on Enhanced Forest Inventory (EFI) data (remote sensing and/or telemetry), the first goal of the TSP will be to automatically assign a prescription based on the NHRI's Silviculture Prescription System (SPS) to the selected blocks in the tactical plan.

Site Potential. In order to select the best sites for growing high quality hardwoods a tool will be developed to evaluate and classify site potential.

Tree Vigour. In order to effectively use the SPS, a tree vigour prediction tool will be developed and implemented based on remote sensing and telemetry technologies (EFI data).

Commercial Thinning Growth Simulator. Already in progress, the commercial thinning growth simulator will need to be completed so that the growth and yield curves could be modified in the growth simulator model OSM.

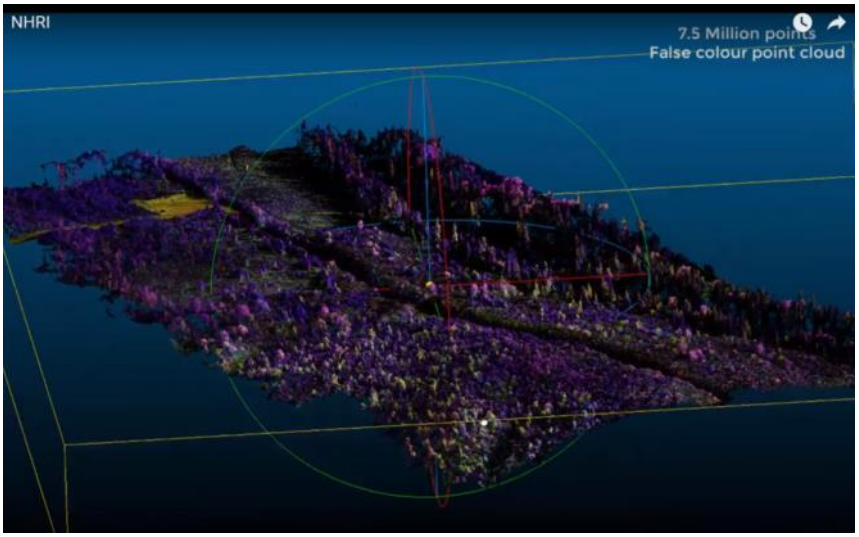
Timber Financial Calculator. A stand simulator compatible timber financial calculator that will ultimately predict the outcomes based on various treatment options is also under development.

Treatment Simulator. Once a prescription is assigned to a stand, a treatment simulator will need to be built and connected to a volume/product simulator to be able to characterize each stand individually.

Optimized Block Selection. Finally, another tool will be developed to optimize block selection. The results churned out by this tool will represent the main components of the operational plan based on various criteria like sawlog yields and road/harvest costs.

EFI IMPROVEMENTS

CHARACTERIZING REGENERATION THROUGH REMOTE SENSING



Forest regeneration over time is one of the main objectives of sustainable forest management. Therefore, it is of great interest to create efficient tools that allow us to predict regeneration from seed production to seedling establishment and beyond. Consequently, regeneration modelling has become progressively more popular. In fact, modelling provides an important tool for synthesis because models can project long-term response to changes in management practices. In addition to new improvements in modelling, decision making in forestry has largely benefited from the development of optimization techniques.

Field assessment of regeneration is time consuming and has limited spatial extent. On the other hand, remote sensing technologies such as satellite images and Light Detection and Ranging (LiDAR) can derive certain forest characteristics accurately. At NHRI, we decided to characterize regeneration using remote sensing in an attempt to better understand the limits of those technologies along a gradient of basal area.

To do so, the Continuous Land Inventory (CLI) plots measured by the New Brunswick Energy and Resources Development (NBERD) department will be used to estimate density, proportion and basal area of the sapling cohort (diameter to breast height (DBH) ranging from 1 to 9 cm) of hardwood, softwood and non-commercial species separately.

We also want to identify which one of the technologies (Sentinel-2 images, LiDAR vs both) is the most accurate for characterizing sapling occupancy, and the limits of those along a gradient of basal area. The variables being considered are:

⇒ Data year
⇒ Treatment history
⇒ Satellite images
⇒ LiDAR

" We decided to characterize regeneration using remote sensing in an attempt to better understand the limits of those technologies ."

PRECISION BLOCK PLANNING

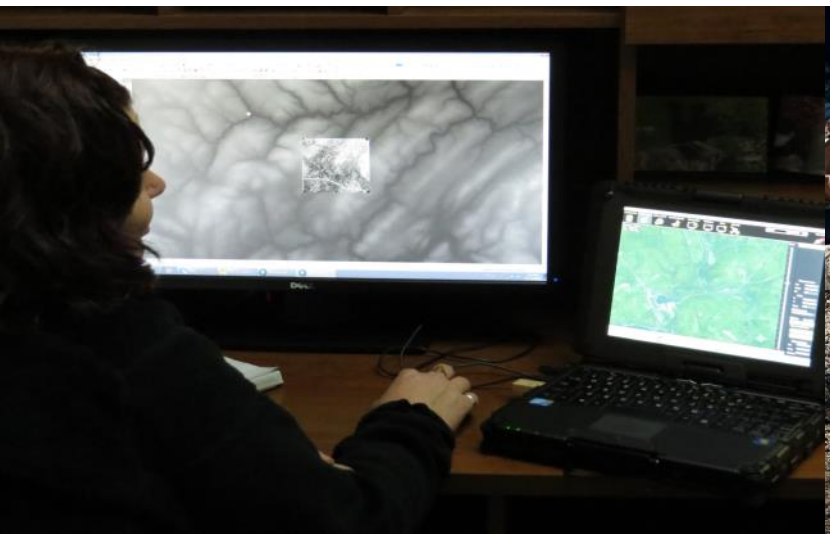
PLANNING FOREST OPERATIONS TO IMPROVE PRODUCTIVITY

Our Precision Block Planning initiative leverages many of our tools to provide forest products companies with an all-in-one operational process. Precision inventories that combine field timber cruises with remote sensing are conducted to assign silviculture prescriptions, set harvest productivity, and volume and saw log recovery targets. Operational results are then compared to inventory based forecasts in order to ensure follow-up and continuous improvement. This initiative is where we put the beta versions of our tools to the test and get feedback from end-users.

More importantly the initiative establishes bold targets that aim to improve the productivity of participating companies on several fronts. These targets are incentives and key process indicators for the teams involved (NHRI and Company) to think outside the box and strive to use the best available knowledge and cutting edge tools. When those are not available, or not yet effecient enough from an operational perspective, our team finds the right partners to develop them and then work towards implementation as fast as possible - and the cycle continues. At NHRI we always strive to advance knowledge and tools by following the principles of Agile design and development. The precision block planning initiative is a perfect project for such an approach. It allows us to work with a multitude of partners (mainly IT and geomatics companies) in order to test out new technologies and processes to improve productivity. By setting out ambitious objectives we force ourselves and our partners to focus on solutions and always think in terms of continuous improvement.

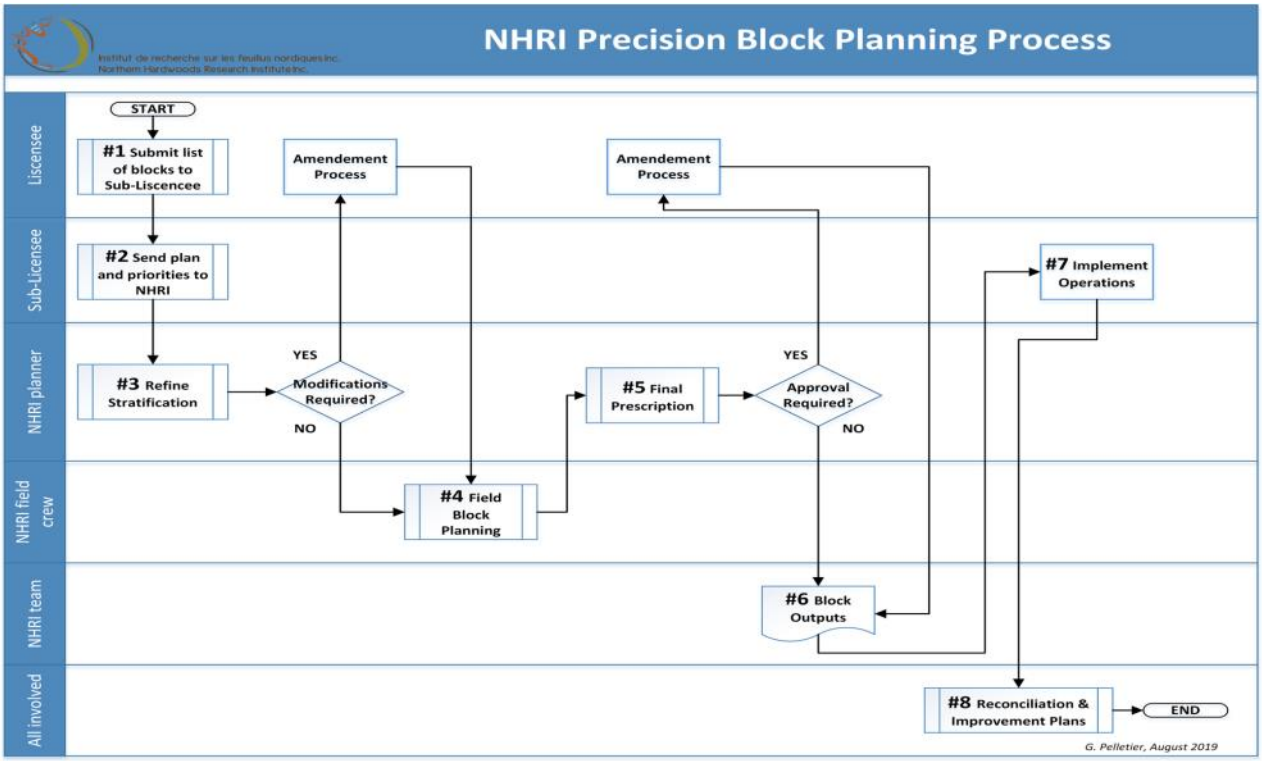
Objectives and Benefits

Harvester Productivity	Delivered Wood Costs	Sawlog yield	Planned inventory at mill	Turnover in harvesting contractors
From : (average or typical, broken down in 3 categories based on tree size and volume to cut per hectare and expressed in m3/productive machine hour) in 2018 **To: 110% in 2020**	From : (average or typical, including roadside cost +delivery cost + overhead costs expressed in $/m3) in 2018 **To: 95% in 2020**	From : (average or typical, expressed as % of sawlogs from all round wood products subject the same utilization and merchandizing standards) in 2018 **To: 115% in 2020**	From : (average or typical, expressed monthly in # weeks of inventory against targets)) in 2018 **To: +- 20 % in 2020**	expressed as # of exits/replacements in 2018 **to 90% in 2020**



PLANNING, OPERATIONS AND CONTINUOUS IMPROVEMENT

PRECISION BLOCK PLANNING IN ACTION—BLOCK PLANNING PROCESS



PRECISION BLOCK PLANNING

PRECISION BLOCK PLANNING IN ACTION— DELIVERABLES

FOREST MANAGEMENT
Wood Supply

Planning
Precision Forest Inventories

PRECISION FOREST INVENTORIES
- Improved block stratification – micro stand level
- Precision Inventories – Remote sensing and field cruize

STANDARD OPERATING PROCEDURES
- SOP for production of precision inventories based on best available technologies

TRAINING
- Training for planning team on SOP procedure

Operations
SPS Implementation

PRESCRIPTION ASSIGNEMENT
- NHRI SPS Operationalisation – block level

WORK ORDERS
- Production of work orders alligned with SPS

OPERATIONAL PLAN
- Sub-set of Group Savoie's operational plan and support in preparation of 2020-2021 plan.

COACHING AND CONSULTATION
- In the field ad hoc coaching on SPS implementation – supervisors, contractors and operators.

TRAINING
- SPS implementation workshop
- Bucking for value workshop

Continuous Improvement
KPI's and Follow-up

PERFORMANCE INDICATORS
- Elaboration of performance indicators and production of management dashboard

BLOCK AUDIT PROCESSES AND TOOLS
- Etablish a process and tools to audit harvested blocks
- Validation of productivity curves

DATA MANAGEMENT
- Improve block management data collection and analysis.

TRAINING, COACHING AND CONSULTATION
- Ad hoc field coaching on audits and post operations follow-up.
- Delivery of workshop to planning team on implementation of continuous improvement tools – audit forms, database management, data analysis, etc.

PLANNING, OPERATIONS AND CONTINUOUS IMPROVEMENT

PRECISION BLOCK PLANNING IN ACTION — CONTIUOUS IMPROVEMENT

PERFOMANCE INDICATORS (Management Dashboard)

Inventory (Block Description)	Prescription (Recommendation)	Operations (Forecast)	Verification (Actual)
➢ # Block ➢ # Section ➢ Area (ha) ➢ QMD ➢ Basal Area ➢ FUNA ➢ % Species ➢ % AGS/HUGS ➢ Stems/ha ➢ M^3/ha ➢ M^3/Tree	➢ SPS - Prescription ➢ Harvest System ➢ Trail Pattern ➢ Work order #	➢ M^3/MH ➢ % Sawlogs ➢ $/ M^3	➢ Treatment ➢ Harvest System ➢ Trail pattern ➢ MH/Bloc ➢ M^3/MH ➢ $/ M^3 ➢ % Sawlogs ➢ M^3/ha

A New Planning Approach to Improve Productivity and Quality in Forestry Operations.

Gaetan Pelletier, Executive Director of NHRI, presented the highlights of NHRI's Precision Block Planning initiative during the Canadian Woodlands 2019 Fall Meeting. Precision Block Planning aims to provide forest products companies with an all-in-one operational process. Precision inventories that combine field timber cruises with remote sensing are conducted to assign silviculture prescriptions, set harvest productivity, volume and saw log recovery targets.

WATCH VIDEO

DOWNLOAD SLIDES

PLANNING, OPERATIONS AND CONTINUOUS IMPROVEMENT

PRECISION BLOCK PLANNING IN ACTION—PARTNERSHIP WITH LIM GEOMATICS

We are very pleased to announce that NHRI is partnering with Lim Geomatics for the development of adaptive precision silviculture tools. In fact, the Northern Hardwoods Research Institute (NHRI) became the first customer in the world for Lim Geomatics' new timber cruising product called PRISM. Timber cruising is not only the foundation of effective forest management but also necessary for research and development field work at NHRI.

This product will become the official platform for geo-referenced data collection and will be thoroughly tested during the NHRI's 'Precision Block Planning Initiative' implemented with Groupe Savoie on NB Crown License #1 – managed by AV Group.

Built upon a modern ESRI framework, PRISM is comprised of a web and mobile app that work together to plan and perform successful cruises. The web app provides an intuitive interface for designing, assigning, and monitoring the progress of cruises. Prism is highly configurable to meet the needs of today's foresters as they can create a variety of cruises for diverse management goals and ecosystems. Prism can also be configured for unique silviculture practices, workflows, and company data structures. These latter capabilities, along with Lim Geomatics great track record and reputation are what made it attractive to the NHRI team.

Designed on the ArcGIS Online platform, Prism seamlessly integrates with a variety of existing data-collection applications and GIS tools. The application also streamlines data management with enterprise technology into the Cloud eliminating the need for complex file handling and transfers.

Upon successful implementation, Lim Geomatics will elaborate a workplan to investigate if the PRISM app could become the host platform for the NHRI's professional version of its tools such as the Silviculture Prescription System, the treatment cost calculator, the product prediction tool, the tree classification tools, the harvesting cost functions and many other apps yet to be developed.

The Northern Hardwoods Research Institute is happy to embark on this venture with Lim Geomatics; an innovative company with a demonstrated track record and reputation. Founded in 2006, Lim Geomatics has built a trusted brand worldwide for developing and implementing innovative geospatial solutions and services.

This project is another excellent example of how our team is constantly developing partnerships that give us access to next-generation forest management technology in order to validate and field test them for our clients.

For more information on Prism click here.

" This project is another excellent example of how our team is constantly developing partnerships that give us access to next-generation forest management technology in order to validate and field test them for our clients."

KNOWLEDGE MOBILIZATION

IMPROVING - ENABLING - TRAINING - INFORMING

One of our key operating principles at NHRI is: "no research for the sake of research". Put in a positive way it essentially means that any and all research that is conducted within our walls must be useful and have a well-defined end user. In order to achieve this, we've had to spend considerable energy and resources to the task of flipping the traditional research center model on its head. Instead of having a highly qualified research team sit in a lab and think of interesting research questions; we work with various stakeholders to identify the real issues happening in the forest and turn them into applied research projects. We essentially took a top down model and flipped it into a bottom up approach. Instead of going in the field to answer questions developed in an office; we take questions from the field and bring them into our board room and labs.

The NHRI was created with very specific objectives which can be boiled down to working with our academic, government and industry partners to develop, or improve, knowledge, methods and harvesting techniques aimed at increasing volume and value of the northern hardwoods resource. In a nutshell, the NHRI was created to bring immediate, applicable and field-tested solutions for foresters, contractors, woodlot owners and forest workers with boots on the ground and eyes on the canopy.

For our team this means that all research and filed work must be focused exclusively on that end. Our boots on the ground approach to research and our close relationship with the stakeholders has allowed us to position ourselves not only as knowledge producers, but more importantly as knowledge mobilizers. Knowledge transfer and practical on the field training is an important component of our work at NHRI. Knowledge mobilization is at the forefront of our mandate and it revolves around four key approaches.

IMPROVING our partners' forest management capacity through consultancy and the development and implementation of management and decision support systems.

ENABLING better management and decision making by developing best management practices, models, tools, APPs and analysis capacity.

TRAINING staff and professionals through workshops, videos and courses.

INFORMING the scientific/professional community and the public at large by publishing papers, reports, conferences, social media, newsletters and presentations.

Our team is constantly working to improve our knowledge mobilization capacity. Based on the results we have seen, and our partners' comments, we are convinced we are on the right track. The objective now is quite simply, more and better knowledge mobilization.

SILVICULTURE TRAINING IS ABOUT TO GO MAINSTREAM!

HOW OUR TEAM IS WORKING TO MAKE KNOWLEDGE ACCESSIBLE, USEABLE AND USEFUL!

eLearning Silviculture Training
Making the NHRI's Silviculture Prescription System Easily Accessible!

Over the years our team has acquired considerable experience when it comes to delivering training in the field. Whether it be offering workshops on the operationalization of the NHRI Silviculture Prescription System, field exercises to better identify form and risk issues at the tree level, or delivering a full day training on optimizing tree bucking, we have developed a solid capacity when it comes to creating knowledge and learning content, and delivering it. The question has now become, how do we take it to the next level?

We think the answer can be found in developing partnerships to offer silviculture training on open eLearning platforms such as UdeMy.com. Our goal is to make our NHRI Silviculture Prescription System accessible and easy to learn for any forestry worker, anywhere. So, a few months ago we started small and began working on turning one of our most successful workshops, Bucking for Value, into a video learning format that could be downloaded onto an open eLearning platform. The video training, which was prepared by Monique Girouard, has 11 video lectures divided into 6 modules and is entitled; *Introduction to bucking hardwoods for value*. This course was released in both French and English in December of 2019.

While we are excited about this new tool in our arsenal it is only a beginning and not an end. The initial video lecture series was meant as a trial run for a much larger project we are currently developing in collaboration with other academic and industry partners – UNB, University of Maine Fort Kent and Université de Moncton. The objective of this larger training initiative will be to develop and make accessible comprehensive training courses for the silviculture of northern hardwood and mixed wood stands. The primary purpose of the project is to produce a series of media products in support of the NHRI Silviculture Prescription System (SPS) to train foresters, technicians, students and woodlot owners. The training series will be divided into 6 courses which will in turn be divided into modules and video lectures. Examples of proposed courses for this project are:

COURSES FOR THE SILVICULTURE OF NORTHERN HARDWOODS AND MIXEDWOODS STANDS

1. Introduction to the silviculture of northern hardwood and mixed-wood stands (approx. 10 hours)
2.Adaptive silviculture in the context of a changing climate (approximately 2 hours)
3. Silviculture options for problem stands (beech) (approx. 2 hours)
4. Intermediate silviculture treatments to improve growth, yields and tree quality (approx. 2 hours)
5. Evaluating trees for quality and vigour (approx. 1 hour)
6. Introduction to Bucking Hardwood Trees for Value (approx. 1 hour)

This eLearning open access video training project is one of our most important knowledge mobilization projects for 2020-2021… we are very excited about developing the content and look forward to launching some of the key modules as early as spring 2020.

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

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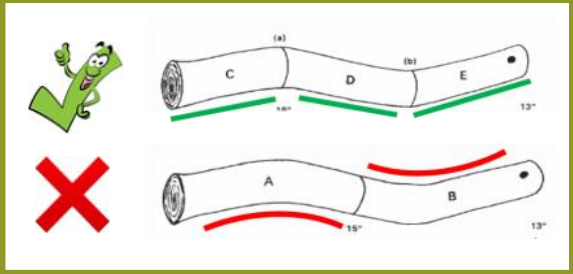


BUCKING FOR VALUE
ENROLL NOW

SILVICULTURE TRAINING IS ABOUT TO GO MAINSTREAM!
HOW OUR TEAM IS WORKING TO MAKE KNOWLEDGE ACCESSIBLE, USEABLE AND USEFUL!

eLearning Silviculture Training
Interactive Web Tools and Mobile Apps

Another very promising project we have in the pipeline for 2020 is the development of interactive web tools and mobile Apps. These types of tools are simple ways to help people in the forestry sector learn about the NHRI SPS, and more importantly, enable them to use these tools when making decisions regarding the management of hardwoods and mixed forests.

INTERACTIVE WEB TOOLS

In support to the content developed for the courses mentioned in the previous page, the NHRI will produce novel interactive web tools. We will produce a series of short Virtual Reality, 360° videos, Augmented and Mixed reality games to illustrate some key concepts learned in the courses. The footage will be captured in real forests and provide an experience close to being there on site.

Virtual and interactive visits to stands will be designed for professionals to practice the concepts covered in the course material.

WEB AND MOBILE APPS

Web and mobile device apps (Android and Apple) will be built so that specialists and landowners can implement the right practices using the body of technical knowledge that we have developed. Users will be prompted to provide inventory metrics when prompted by the App to end up with a full diagnostic of the forest and recommended treatments to restore to functional ecosystems. These applications will be available under our "NHRI Tools" application. The modules to develop are:

1. SPS v 2.0	Beta version out
2. NHRI tree classification system	Q1, 2020
3. NHRI SPS implementation checklists	Q2, 2020
4. Intermediate treatment (PCT, CT) decision keys	Q3, 2020
5. NHRI prescription simulator	Q4, 2020

DOWNLOAD NOW
NHRI TOOLS—SPS 2.0
(Beta Version)

iPhone android

SUBSCRIBE

UPCOMING EVENTS

Canadian Woodlands Forum
FORUM
Forum canadien
des opérations forestières

The Canadian Woodlands Forum **2020 Spring Meeting & 101st AGM** will be held in Moncton, New Brunwsick on April 1st and 2nd. To find out more as details become available follow the link below.

MORE INFO

The New Brunswick Federation of Woodlot Owners will be hosting a conference entitled "**Your Forest in a Changing Climate"** on January 29th, 2020 from 9am-4pm at the Hugh John Flemming Forestry Center in Fredericton, New Brunswick.

MORE INFO

Propriétaires de boisés
N B
Woodlot Owners

UPCOMING EVENTS

International Forest Business Conference

The goal of the International **Forest Business Conference 2020** is to focus on megatrends that shape forest and wood industry sectors, highlight the transformation of forest related businesses towards a low-carbon bioeconomy, discuss tensions between sustainability and cost competitiveness, and call attention to new green innovations.

MORE INFO

Forest Nova Scotia's **86th Annual General Meeting** will be held February 11th & 12th, 2020 at the Halifax Marriott Harbourfront Hotel in Halifax.

MORE INFO

Forest Nova Scotia

FORESTS ONTARIO

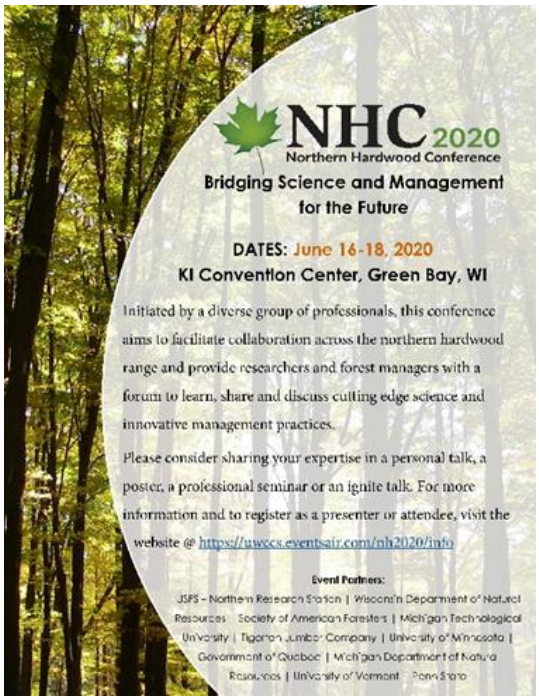
The Forests Ontario **Annual General Meeting** will be taking place on Friday, February 14th from 7:45am-8:45am, prior to the opening of conference. More details coming soon.

MORE INFO

UPCOMING EVENTS

NHC 2020 NORTHERN HARDWOOD CONFERENCE

Bridging Science and Management for the Future



Are you a forest manager, industry representative, researcher or academic who works with northern hardwoods? The **2020 Northern Hardwood Conference** is now accepting abstracts on a range of topics related to northern hardwood science and management.

MORE INFO

MIXED SPECIES FORESTS
Risks, resilience and management
25-27 March, 2020
Swedish University of Agricultural Sciences
Lund, Sweden

Mixed forests are strategic means of adapting forest management to climate change. Higher tree species diversity is expected to provide higher productivity, higher temporal stability, lower risk of biotic and abiotic disturbances and a more diverse portfolio of ecosystem services from forests. Although the knowledge base concerning the ecology of mixed forests has increased during the last decades, almost all forest research has been conducted in monocultures. As a result, there is a lack of knowledge about how to design and manage mixed forests, to sustain production and carbon sequestration, and mitigate abiotic and biotic risks. It is our expectation that this conference will be an arena for discussion and communication between researchers from different disciplines, and also between managers and policy makers. Our main objective is thus to communicate the state-of-the-art scientific knowledge in various fields connected to both mixed forest functioning and management.

MORE INFO

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