Proceedings of the Quesnel Future of Forestry Think Tank

May 3-4, 2018

UNBC/CNC North Cariboo Community Campus
Quesnel, BC

Photo credit: Nancy Lilienweiss

Executive Summary

Sixty-five participants from the provincial government, the forest industry, research institutions, universities and funding organizations convened for two days in Quesnel to explore new opportunities for forest management and forest products manufacturing at the Future of Forestry Think Tank. The main focus of this technical working session was to explore opportunities to use Quesnel as an incubator to accelerate research and development in the domains of alternate forest management and innovative manufacturing and processing of forest fibre. The intended outcome of this two-day session was to document specific opportunities to accelerate the reinvention of our forest management practices and manufacturing processes in order to address the current and emerging wicked problems currently facing BC.

The Cariboo Region of BC has recently experienced disturbances of a scale and severity without historical precedence. Mountain pine beetle outbreaks of the late 1990's and early 2000's were quickly followed by a series of large scale, high severity wildfires, and more recently, the Douglas-fir and spruce beetle populations have increased to outbreak levels. Further, climate warming predictions forewarn that these disturbances will continue to increase in size and severity. This unprecedented pattern of ecological disturbance will have a significant negative impact on the region's economy and culture. The speakers and attendees of the think tank were assigned the task of framing how we got into this condition, what the future holds, what resilience looks like, and how we plan and manage for resilience into the future.

The following is a summary of the recommendations from the think tank proceedings; note that numbers do not imply prioritization.

1. Plan and manage ecosystems for ecological resilience
2. Optimize fibre recovery and utilization, realize more value, and reduce costs
3. Assess the market demand for future forest products
4. Secure investments that diversify the manufacturing hub
5. Develop the non-timber or non-fibre forest product potential
6. Expand training, education, and research at the North Cariboo Community Campus
7. Establish a Quesnel & Area Forestry Leadership Group

There are a number of roles for the Provincial government to support the implementation of these recommendations and they range from immediate actions already enabled through policy, support for amendments or exemptions to legislation as required, to longer term legislative changes that would apply to the entire province, not just Quesnel. Quesnel and the Quesnel TSA offers a unique opportunity to incubate new approaches, learn from those approaches, and scale-up to address similar challenges throughout the forest dependent communities in BC's Interior.

Introduction

The sense of urgency to address the challenges facing the ecosystems, the communities and the future of the forest products manufacturing sector in Quesnel cannot be understated. As Quesnel Mayor Bob Simpson stated at the event, the unprecedented catastrophe of 2017 has not been met with an unprecedented response by the Provincial government to date. The current challenges are mounting and accelerating; immediate action and support from the province to maximize change by exploring and seizing emergent opportunities to enable a new management paradigm is vital. Changes are needed in provincial legislation over the long term, however this will take time and action is needed *now*. The province needs to explore what tools it has at its disposal to enable an experiment in Quesnel as an incubator starting immediately and determine what tools exist for landscape level planning, restoration, and management.

The purpose of this report is to outline the proceedings from the Future of Forestry Think Tank, including outcomes from conversations based around the topics of: ecological and social system resilience; innovation and sustainability in manufacturing; training, education and research; and next step is to put the recommendations in this report into action. This report also includes appendices with: panel presentations; event agenda; list of participants; and an acronym list.

The speakers and attendees of the think tank were assigned the task of framing what land management practices brought us to our current situation, what the future holds, what resilience looks like, and how we plan and manage for resilience into the future. After each of the panel presentations (see appendix 1), participants were separated into eight pre-determined groups to ensure a mix of policy, funding, academic and industry perspectives to have facilitated, structured conversations (four in total).

The following list of 7 recommendations was developed from the think tank proceedings (note that numbers do not imply prioritization). A more fulsome description including the context of the recommendations, associated goals, actions, policy needs, and potential funding sources is contained in the section 1 through section 4 of this report.

1. Plan and manage ecosystems for ecological resilience
2. Optimize fibre recovery and utilization, realize more value, and reduce costs
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Many of these recommendations and their actions align with recommendations in the BC Flood and Wildfire Review report *Addressing the New Normal*, April 2018, as well as the Auditor General's report *Managing Climate Change Risks: An Independent Audit*, Feb 2018.

Section 1 - Ecological Resilience

Recommendation 1 - Plan and manage ecosystems for ecological resilience

Goals

- Enable landscape level planning and management west of the Fraser River in the Quesnel TSA for resilience to insect, disease, fire and other catastrophic change agents driven by climate change
- Create more diversity in species, age and structure west of the Fraser River in the Quesnel TSA by restoring a patchy, heterogeneous landscape that is resilient to future catastrophes
- Increase ecological resilience by securing significant investments in research and development to advance understanding of: historical and likely future forest landscape pattern conditions; improving and adapting current management strategies and tactics and; improving the skill, adaptability, and versatility of manufacturing, merchandizing, and marketing sectors to respond to what the ecosystems offer

Setting the Scene - How did we get here? Fire, native forest insects, and pathogens have co-existed in relative harmony with native forest and rangeland ecosystems of the Cariboo Region for millennia. Wildfire was a frequent visitor (every 5 to 30 years in dry forest and grassland ecosystems in the south and every 40 to 60 years in the cooler and wetter forest ecosystems in the north), and the First Nations intentionally used fire annually for land and food resource management. The resulting frequency and patch sizes of burned and recovering areas limited fire growth and severity on the landscape. The high frequency of wildfire events resulted in a fuel limited landscape, which moderated future wildfire severity and the size of subsequent events.

A policy of wildfire exclusion, implemented early in the 20th century, outlawed intentional First Nation traditional burning, and created a highly industrialized fire suppression workforce, which effectively reduced wildfire frequency and severity as early as the 1940's, and in some places much earlier. This period of fire exclusion coincided with a 50-year period (1935-1985) of moderating climate, which reduced fuel availability to burn and enabled early fire suppression successes.

By the early 2000's, hazardous fuel conditions emerged over millions of hectares; a product of ongoing bark beetle outbreaks and timber harvest practices with a largely inconsistent and ineffective policy of post-harvest fire hazard abatement. Moreover, a rapidly warming climate was increasing fuel availability to burn and the drought susceptibility of large areas of older lodgepole pine, spruce, and Douglas-fir forests.

Forest managers and policy-makers thought they were limiting the damaging effects of disturbances and providing a predictable forest inventory and economic prosperity for future generations. Little did they know that our forests were highly adapted to wildfires, and that they needed this constantly evolving patchwork of burned and recovering areas to remain fire-adapted. Today, we need to (re)learn how to better co-exist with wildfires.

What does the future hold if practices remain the same? Climate change research forewarns that in the next 30 years, central BC will see a 3- to 4-fold increase in area burned. Increased area burned will be driven by drought-caused tree mortality, earlier snowmelt conditions leading to prolonged summer droughts and wildfire seasons, stronger wind events, and increased lightning activity. Large areas of dead and dying forest are susceptible to subsequent wildfires due to the potent influence of elevated fine and woody fuels. Areas of forest containing large slash deposits will function as conveyor belts for rapid, severe, and large-scale wildfires.

Synchronized regeneration of large areas to young lodgepole pine forest will result in synchronized future landscapes that are susceptible to bark beetles. Today's landscapes are synchronized for future large-scale wildfires, insect defoliation, and bark beetle mortality events. Without large scale treatments to re-create forest heterogeneity and tailor it to the topography, the future landscape will be even more synchronized for large events.

What is ecological resilience and how do we manager for it? A high resilience ecosystem regains its structure and function, even in the face of moderate climate variability, invasive species, and disturbance stressors. In dry, moist, and cold forests of the Cariboo Region, ecological resilience was historically driven by the variability of the natural wildfire regime. For each forest type, wildfires, occurring in a characteristic range of frequencies, patch sizes, and severities, yielded predictable patterns of forest successional, fuel, and non-forest conditions. These patterns re-enforced the characteristics and natural variability of the wildfire regime; there was "cross-talk" between the patterns and the processes. Ecological resilience did not depend on trees surviving disturbance, but on the larger ecosystem's ability to *adapt* to disturbances.

Ongoing, characteristic, wildfire and fire-surrogate (mechanical thinning followed by prescribed fire and stand-alone prescribed fire) disturbance is the key to the ecosystem, and it is the key to future climate change adaptability, as well. Today's forests are poorly adapted to wildfire and climate change. Historical forests were highly adapted to both. Without large scale mitigation, given today's forest conditions, managers can expect large reductions to forested area from future wildfires, and large-scale tree and other plant species range shifts. With large scale mitigation, managers can expect improved wildfire and climate change adaptation of those same forests.

We can manage for ecological resilience by restoring a more characteristic wildfire regime to each forest type, and more characteristic successional and lifeform patterns to support them. These restored conditions can be readily tailored to the topography. Complicating these efforts however, is the enormous scale of the current dysfunction, the speed and scale at which mitigation investments can be budgeted, planned for, implemented, and realized, the unpredictability of future disturbance interactions with climatic changes, and the need to mitigate some future effects, as well.

Actions to advance ecosystem resilience:

- **Establish pilot areas, both** in the Quesnel TSA west of the Fraser River and other areas where applicable, that are large enough to apply and test landscape level planning scenarios
- **Convene a planning table** made up of tenure holders, First Nations, UNBC researchers, and government agencies who have interests and/or decision authority within the identified landscape (see recommendation 7)
- **Engage Dr. Paul Hessburg** and utilize his methodology and principles for landscape evaluation and landscape prescriptions. This large, and complex effort will include, but not be limited to:
    - A review of contemporary literature that can help inform the new strategy. These sources include: existing plans and analyses - such as the Cariboo Forest Health Strategy, climate change strategies, silviculture strategies, Quesnel Fuel Treatment Opportunities, Quesnel and Area CWPP, others),
    - A required investment in research and development to advance our understanding of: historical and likely future forest landscape pattern conditions, including the resilience of key wildlife habitat under a landscape management paradigm; new and adaptive management strategies and tactics; required skills development; and, , required changes (adaptability and versatility)in manufacturing, merchandizing, and marketing of forest products,
    - An analysis of the historic range of variation for disturbance patterns and processes, current departure, and future range of variation. The analysis domain will involve the range of BEC zones and subzones with much of the detailed landscape analysis centered at the sub-watershed scale.
    - The collection of key biotic and abiotic information that is used to run the landscape analysis models as well as peripheral models assessing carbon dynamics, future wildlife habitat, etc.
    - Planning and operational strategies for achieving future ecosystem resilience. Strategies will include, but not be limited to: planting, seeding, prescribed burning and reburning (BC Flood and Wildfire Review, recommendation #75, strategic shift #9) (Managing Climate Change Risks: An Independent Audit, summary) and encouraging deciduous species.
    - Provide professional development for all local forest professionals around landscape evaluation and ecosystem resilience (links to recommendation 6)

- In the interim, before the landscape analysis and management strategies project is completed, the following are areas in need of action, including necessary changes in existing policy to advance ecological resilience:
    - Determine the most appropriate landscape management (governance) system to manage under in the future.
    - Re-assess the existing legislated wildfire hazard guidelines and if need be, adjust them. Work with the licensee and forestry contract community to develop a long-term strategy to increase the scale and effectiveness of prescribed burning. Create legislative incentives for more aggressive fuel hazard mitigation across all ownerships and tenures.

- Prioritize and provide funds for staff resources of MFLNRORD and local First Nations to be on the ground and aid in the collection of data used in landscape-level evaluation and subsequent ecosystem resilience planning.
- Develop a long-term monitoring program for forest health and natural disturbance vulnerability**.**
- Minister of MFLNRORD to exercise abilities under FRPA s.26 to direct actions for biotic and abiotic management, and s.27 regarding a forest health emergency
- Utilize existing innovation within FRPA and regulations (i.e., GAR orders, land use orders, existing decision-making authority) to initiate the new approach in the Quesnel TSA to "un-fix" OGMA and MDWR restrictions from the landscape, enable modified stocking standards to include deciduous, amend existing FSPs and assign FDU's accordingly
- Evaluate current FRPA s.108 needs from 2017 wildfires, the costs, and how they align with the proposed new approach west of the Fraser River in the Quesnel TSA
- Create financial incentives for post-harvest hazardous fuel mitigation through amendments to the Interior Appraisal Manual.
- Develop objectives for fire and forest health in FRPA and FPPR (BC Flood and Wildfire Review, recommendation #66, strategic shift #7)
- Amend the current Open Burning Smoke Control Regulations to allow for greater prescribed burning opportunities.
- Employ "full cost-benefit accounting" of investments in creating resilient forests, i.e., make investments in building and maintaining resilience commensurate with potential financial losses due to wildfire (Managing Climate Change Risks: An Independent Audit, summary). Ensure the real payback benefit of loss prevention is properly accounted for when evaluating landbase investments

Funding opportunities to advance ecosystem resilience

- Approach MFLNRORD, FESBC and NDIT to pay for the landscape evaluation process and implementation (existing programs include FCI, FFT)
- CCATEC to approach federal government for capacity and training funds for First Nations involvement
- Natural Sciences and Engineering Research Council of Canada (NSERC)
- Social Sciences and Humanities Research Council of Canada (SSHRC)

Section 2 - Innovative and Sustainable Manufacturing Sector

Quesnel remains one of BC's most forest dependent communities and the Quesnel timber supply area has been hit hard by both the mountain pine beetle epidemic and 2017 wildfires, creating significant uncertainty about the economic future of the region. However, Quesnel is still home to one of the most integrated and diverse concentrations of wood products manufacturing facilities in the world, including many "best in class" milling and processing operations.

Both the land base challenges in the Quesnel TSA and the co-location of diverse manufacturing operations present a unique opportunity to use Quesnel as an incubator for generating ideas about new ecosystem management paradigms. This could be adapted to develop resilience to climate change induced disturbances and stresses and how forest product manufacturing processes can be innovated to take better advantage of the kind of fibre BC's central interior forests will provide in the future.

Recommendation 2 - Optimize fibre recovery and utilization, realize more value, and reduce costs

Goals for optimizing fibre recovery and utilization

- Expand beyond current "economic radius" from the manufacturing cluster in Quesnel; push the radius to the further corners of the TSA and decrease transportation costs
- Utilize non-traditional sources/locations of fibre, such as commercial thinning and harvesting on steep slopes, and dead wood within the wildland-urban interface

Actions to optimize fibre recovery and utilization

- **Identify specific fibre needs, fibre locations, and possible intermediate yard locations** considering proximity to fibre sources, public or non-public roads, and types of trucks to be used
- **Build on and learn from existing innovative practices underway or recently completed**, including: whole tree harvesting (C&C, Quesnel River Pulp), small top wood being sold from Dunkley to Pinnacle
- **Learn from other log sort yards** that exist now, or were tried in the past (i.e., Vernon, Revelstoke)
- **Build a centralized log sort/breakdown/reload facility** outside of Quesnel
- Explore whether **nine-axle trucks** could be utilized on roads in the Quesnel TSA
- **Create incentives for partnerships** between small operators and large forest licensees and, recognize the competitive advantage of having cooperative, "vertically integrated partnerships"
- Review existing silviculture strategies, FFT operations to **determine eligible areas for commercial thinning** and when they could be harvested; learn from Cranbrook trial using commercial thinning and managing for wildfire hazard reduction
- **Review the Quesnel CWPP** for proposed fuel management operations close to the manufacturing hub in Quesnel for fibre opportunities

Policy needs to optimize fibre recovery and utilization

- Explore tenure instruments such as modifications to grades for cut control accounting, or more flexibility in cut control exemptions and credits on secondary fibre (including deciduous) as a trial to determine whether it impedes innovation in utilizing more fibre and timeliness to get fibre to market

Engage MOTI where regulations pertaining to hauling on public roads need modification

Funding opportunities optimize fibre recovery and utilization

- Approach MFLNRORD, FP Innovations, NDIT and FESBC to pay for the development of the log sort yard and the future manufacturing potential in Quesnel based on existing operations and emerging markets

Recommendation 3 - Assess the market demand for future forest products

Goals for assessing the market demand

- Determine which evolving forest products have the greatest potential market demand to support or augment existing Quesnel-based companies with manufacturing synergies, including:
    - Structural products such as cross-laminated timber, engineered wood products, modular home manufacturing
    - Non-structural products such as wood fibre insulation, biochemicals, extracts from bark, nanocellulose microfibrils

Actions to assess the market demand

- **Assess the market demand** for evolving forest products considering the following:
    - **The existing manufacturing hub** in Quesnel - what is the next logical "addition" to the hub in terms of lowest investment and greatest market potential
    - **The current and future fibre supply** needed for forest products
    - **The feasibility** of expanding the manufacturing hub

Photo credit: Jeff Mycock

Funding opportunities to assess the market demand

- FP Innovations, NDIT, MFLNRORD, Forestry Innovation Investment (Market Initiatives Program)

Recommendation 4 - Secure investments that diversify the manufacturing hub

Goals to secure investment and diversify the manufacturing hub

- Invest in a facility(s) to manufacture new forest product(s) that enhance integration and augment existing manufacturing installments

Actions to commence after market demand assessment

- **Seek investors -** consider a mix of private sector and public-sector investments, including: First Nations, BC Housing, FP Innovations, WIDC, Canadian Wood Council, Forestry Innovation Investment etc.
- **Encourage partnerships** through incentives; vertically integrate collectively

- **Consider pilot projects** (subject to market demand assessment) such as: a passive house at Barkerville, wood fibre insulation, portable digester plant, small home construction, modular/pre-fabricated home construction etc.

Policy needs to secure investment and diversify the manufacturing hub

- BC Building Code changes (pending outcome of market demand assessment)
- Establish a BC Innovation Fund

5. Develop the non-timber or non-fibre forest product potential

Goals for developing non-timber or non-fibre forest product potential

- Regulate management and utilization of non-timber, non-fibre or botanical forest products
- Recognize the economic potential of the sector

Actions to develop non-timber or non-fibre forest product potential

- As some non-timber forest products such as berries, mushrooms are traditional foodstuffs of First Nations, **seek First Nations input** on whether there is interest in pursuing commercial opportunities
- **Review CCLUP** for botanical forest product commitments
- **Engage with current and past ventures and topic experts** such as: Likely-Xat'sull Community Forest, Royal Roads University, Moose Meadows Farms etc.
- **Conduct a feasibility study** for various products, including: mushrooms, botanical forest products, birch water, birch syrup, berries, Christmas trees and charcoal. Determine which is most feasible and pilot it first.

Policy needs to develop non-timber or non-fibre forest product potential

- Develop a policy for mushroom harvesting, from planning, permitting jointly with First Nations
- Manage the land holistically including non-timber forest product stewardship

Funding opportunities for developing non-timber or non-fibre forest product potential

- NDIT, Investment Agriculture Foundation of BC, Agroforestry programs

Discussion on innovative and sustainable manufacturing - A useful exercise when considering the future of manufacturing in the region is to reflect on the following questions:

  - What does the future fiber basket look like (species, structure)?
  - What manufacturing/product streams can exploit the outcomes of repeated disturbance (wildfire, insects)?
  - How much is there likely to be?
  - How much will it cost to access it?
  - What is the predictability of supply?

The fibre basket of the future will include the following:

- Dead wood; both standing and down. Merchantable dead wood should be retrieved as quickly as possible. Industry and government need to find a way to economically retrieve dead-downed wood while it still contains some value
- Small diameter wood that is the target of pre-commercial thinning.
- Commercial thinning material (in IDF); enter stands as they start to accumulate surface fuels
- Deciduous (aspen, birch)
- The region is not going to be growing much tight grained, old wood; there is a low predictability it will reach old age and persist

Potential product streams from this profile include (important that a high utilization system be established that steers the raw material to the best end-user):

- Engineered wood products (small diameter wood, dead wood)
- Some sawtimber, veneer, house logs, powerpoles, and pulp (green wood, some dead wood)
- Bioenergy products (green wood, dead wood, deciduous)
    - It will be critical to identify and encourage/incentivize the investment in bioenergy industries that utilize large quantities of material and produce higher end value products than cogen hog and pellets

In the near-term there is likely to be an overabundance of dead wood and pre-commercial thin material; in the long-term there is likely to be dead wood, small diameter material, some larger diameter material (not a lot), and deciduous. Many of the near-term future fibre sources are going to be expensive to access but as part of the larger resilience strategy, they will need to be utilized. The predictability of supply will be an important outcome of landscape modeling and analysis – where is the threshold of treatment where we significantly impede disturbance flow across the landscape? What do those polygons look like that are impeding fibre flow? What products can be derived from them?

Section 3 – Training, Education and Research

Recommendation 6 - Expand training, education and research at the North Cariboo Campus

Allocation of resources to enable applied research, theoretical research, and training opportunities for forest professionals, laborers, and post-secondary students is needed. Expertise will need to be fostered in: landscape level planning and management, ecosystem restoration and resilience, as well as wildfire science and management and alternate manufacturing processes. The North Cariboo Community Campus is uniquely situated to assist with training and education programs from the trades and labourer level (through the College of New Caledonia) as well as the academic level of advancing applied research based on theoretical models (through the University of Northern British Columbia). There is an identified need for a Research Chair at UNBC's North Cariboo Community Campus to assist in the understanding of: historical and likely future forest landscape pattern

conditions; improving and adapting current management strategies and tactics and; improving the skill, adaptability, and versatility of manufacturing, merchandizing, and marketing sectors to respond to what the ecosystems offer.

Goals for expanding training, education and research

- Fully utilize the North Cariboo Community Campus to its full potential to train, educate and research all aspects from forest management to forest products manufacturing, by creating opportunities for local people and to draw talented people

Actions to expand training, education and research

- **Address vulnerabilities in the workforce** including: lack of holistic training (it's often too specific); succession planning within an organization; flexibility in working hours and child care needs; adapting to what young people want and will commit to in the workforce
- **Enable professional development** for forest professionals around landscape evaluation and forest resilience
- **Determine future training and education needs** in the ecosystem management realm. These include: all facets if ecosystem restoration (of fire-maintained ecosystems and the riparian areas within them), hand and machine thinning, prescribed burning, practical experience with fire, forest health surveys, steep slope harvesting, wildfire risk assessment, tree nursery, seed improvement, truck driver training, equipment operators, simulation training etc.
- **Tailor training and education programs** in resource management specifically **to local First Nations** members
- Assess the future training and education needs in the **forest products manufacturing**
- **Explore research opportunities** both applied and theoretical; explore the possibility of a Research Chair at the North Cariboo Community Campus to focus on ecosystem restoration and management for wildfire affected regions
- **Sell Quesnel as a package** of "good wages, low costs, full serviced, indoor and outdoor activities, and quality of life" to attract people

Policy needs to expand training, education and research

- BC Ministry of Advanced Education may be needed to expand the current scope of the institutions at the North Cariboo Community campus

Funding opportunities to expand training, education and research

- Seek research chair endowments or other program funding from Government of Canada, private sector, or other sources
- CCATEC, Work BC, FP Innovations

Section 4 – Next Steps and Future Directions

Recommendation 7 - Establish a Quesnel & Area Forestry Leadership Group

To advance the various recommendations outlined in this report, a Leadership Group needs to be convened with all of the interested and affected tenure holders, First Nations, and every line Ministry that has decision authority over the "pilot" land base. The members of this table will need to be trained on landscape level planning and undertake the exercise of landscape level planning for the health and resiliency of the pilot area. There is an identified need for funded initiatives to advance the necessary applied and theoretical research components, a manufacturing possibilities analysis, emerging wood products market analysis, and workforce training determination. The Leadership Group will require resourcing including funds for support staff to operationalize identified tasks.

Goals for advancing the recommendations from The Future of Forestry Think Tank

- Have one coordinating group to oversee these recommendations, and make the connections from the individual pieces to a collective whole
- Secure funding to hire 1) ecosystem resiliency team lead and 2) manufacturing innovation team lead

Actions to advance the recommendations from The Future of Forestry Think Tank

- **Convene an inclusive group** including but not limited to: the City of Quesnel, Cariboo Regional District, First Nations, MFLNRORD, forest industry, and engaging other organizations on sub-topics as needed. The Forestry Leadership Group would carryout the following:
    - Establish and agree on common principles and purpose
    - Advance and implement the recommendations
    - Secure resources, whether funding, human resources, or new positions
    - Enable a culture shift to managing forests for resilience
    - Inspire a culture shift of innovation in manufacturing of new products
    - Encourage a "vertically integrated partnership" in Quesnel with incentives to collaborate and see the collective hub of manufacturers succeed

Strike committees on specific topics as needed (e.g., ecosystem restoration of fire-maintained ecosystems, riparian restoration of fire influenced landscapes, ecosystem resilience, manufacturing and forest products, training and education)

In Summary

The wicked problems BC is facing are mounting and accelerating and require *immediate* action and support by the province, however the province cannot solve them alone. All parties with a vested interest in healthy ecosystems and healthy communities have the obligation to explore and seize emergent opportunities to create a new forest management paradigm. Through the process of convening leaders in their fields, the learnings from the Future of Forestry Think Tank highlight the need for establishing a pilot site in the Quesnel TSA that is large enough to use as an incubator for restoring ecosystem resilience. The roll out and establishment of others pilots for the other Cariboo TSA's (100 Mile House and Williams Lake) and beyond should be a next step once the incubator project in Quesnel is up and running.

Appendix 1 – Presentations

** Note - all presentations can be found here*

Topic #1 – Responding to the Challenge of Climate Change

Dr. Kathy Lewis, Chair of Ecosystem Science and Management, University of Northern British Columbia, presented on forest health considerations in responding to climate change challenges and creating resilient ecosystems, including how non-traditional commercial species, such as deciduous, can improve ecosystem resilience. Kathy noted that legislation doesn't require forest licensees to monitor forest health beyond free-growing, and MFLNRORD staff capacity and expertise to monitor forest health has decreased in recent decades.

Bob Gray, fire ecologist, R.W. Gray Consulting Ltd. presented on the challenges that excluding fire from the landbase has created, and some considerations to manage forests to increase resiliency to fire. Reburning an area can create a longer period of lower fire intensity. Research suggests up to 40% of the landbase should be maintained in low flammability condition, to act as a barrier to fire spread. These landscapes have little old forest, and what is old is transient in nature (i.e., not fixed in space).

Topic #2 – Future Forest Fibre

Albert Nussbaum, Director, Forest Inventory and Analysis Branch, MFLNRORD, presented on the current impacts to timber supply from mountain pine beetle and fires. Significant areas of the Quesnel TSA have had upwards of half the timber supply killed cumulatively since 1999. Albert noted that future opportunities exist for harvesting timber on steep slopes and in waste.

Shane Berg, Executive Director and Deputy Chief Forester, MFLNRORD, highlighted the opportunities for growing more resilient forests with silviculture and improved genetic seed. Shane highlighted current initiatives including Forests for Tomorrow and the Forest Carbon Initiative.

Dr. Dominik Roeser, Associate Professor, Forest and Wildfire Operations, University of British Columbia (recent move from FP Innovations), spoke about different opportunities to access fibre and the current economic challenges. Fibre can be available from commercial thinning and fireproofing operations, transportation solutions, productivity gains in commercial harvest operations to utilize waste, and operating on steep slopes.

Topic #3 – Maximizing Future Processing Opportunities

Dr. Guido Wimmers, Associate Professor and Chair, Engineering Graduate Program, University of Northern British Columbia, talked about future processing opportunities for structural products. Guido noted that building on site with dimensional lumber hasn't changed in 150 years; prefabricating buildings in a controlled environment with

engineered wood products is standard in many parts of the world. He also noted that tall wood buildings have been around for 1000 years.

Tim Caldecott, Provincial Research Leader, FP Innovations, presented various innovative non-structural products that make up the bioeconomy hub. There are lignin-based products (e.g., resins, thermoplastics), new fibre based products (e.g., textiles, concrete, food), cellulose nanocrystal products (e.g., adhesives, film, cosmetics), and commodity sugars. Tim noted that co-location with the existing manufacturing facilities in Quesnel is an advantage, and he noted models that exist in Finland and Rotterdam. Building the connections and the supply chain is the challenge.

Topic #4 – Critical Workforce Vulnerabilities and Education and Training Opportunities

Quesnel Mayor Bob Simpson noted that when we are considering the next evolution of the forest products manufacturing hub, the need to assess and invest in the human capital in order to maximize the financial capital investments also exists. Quesnel has an existing workforce that works in the forest industry, but he asked participants to consider what the vulnerabilities are if we are working towards a new regime of forest management and manufacturing new products. He also challenged people to consider how the CNC/UNBC North Cariboo campus could be utilized to its full extent.

The table facilitators who guided and captured the key points of the structured conversations were thanked: Mark Barnes; Tracy Bond; Emily Colombo; Ian Hannah; Titi Kunkel; Jacqui Dockray; Nicole Neufeld; Christie Ray; and Lisa Wood.

The Changing Landscape and Fire Ecology of Interior BC Forests Dr. Paul Hessburg, research ecologist with the Pacific Northwest Research Station, US Department of Agriculture, Forest Service gave a special presentation on terrestrial landscape evaluation and restoring patches of forest to increase resiliency and the work undertaken in the Pacific Northwest. Dr. Hessburg and his research team work under the ecological paradigm that ecosystem properties on the landscape are continuously emerging over space and time. This concept has huge implications for land managers, showing that management needs to be a dynamic problem-solving process rather than one of stand-level prescriptions and static reserves. This research demonstrates the need to revise static retention strategies in disturbance-prone dry forests, describing instead a whole-landscape conservation model. His presentation can be found **here**.

Appendix 2 – Agenda

May 3, 2018
11:30 am Registration begins
12:00 pm Lunch & Networking
12:50 pm Welcome from Chief Clifford LeBrun, Lhtako Dene Nation
1:00 pm Opening Remarks from Minister Donaldson, FLNRORD
1:20 pm Opening Remarks from Quesnel Mayor Bob Simpson
1:40 pm Ground rules and facilitator comments, Mike Simpson
1:45 pm Topic #1 Panel: Responding to the Challenge of Climate Change
2:45 pm Topic #1 Structured Conversations
4:00 pm Break
4:15 pm Topic #2 Panel: Future Forest Fibre
5:15 pm Topic #2 Structured Conversations
6:30 pm Dinner & Networking
7:30 pm Summary of Conversation Outcomes from Topics #1 & #2
8:00 pm No Host Bar and Networking with 10:00pm close

May 4, 2018
8:00 am Breakfast & Networking
8:30 am Welcome & Opening Remarks from Chief Stuart Alec, Nazko First Nations
8:45 am Opening Remarks from CRD Vice Chair John Massier
9:00 am Topic #3 Panel: Maximizing Future Processing Opportunities
10:00 am Topic #3 Structured Conversations
11:00 am Summary of Topic #3 Conversation Outcomes
12:00 pm Lunch & Networking
12:30 pm "The Changing Landscape & Fire Ecology of Interior BC Forests" by Dr. Paul Hessburg:
2:00 pm Topic #4 Critical Workforce Vulnerabilities and Education & Training Opportunities - Mayor Simpson
2:05 pm Topic #4 Structured Conversations
3:00 pm Summary of Conversation Outcomes
3:30 pm Next Steps

Appendix 3 – Participants

The following were present for at least a portion of the Think Tank.

Last Name	First Name	Organization, position
Adams	Ralph	Ministry of Environment and Climate Change, Air Quality Meteorologist
Albers	Rod	West Fraser Bio - Conversions
Alec	Stuart	Nazko, Chief
Alphonse	Janine	CCATEC
Armstrong	Dyon	Dunkley
Armstrong	Mike	COFI, VP Forestry
Barnes	Mark	UNBC, Director of Research
Belyea	Dave	Forest Industry Advisor, FP Innovations
Bennett	Allan	MFLNRORD, Director, Timber Pricing Branch
Berg	Shane	MFLNRORD , Deputy Chief Forester
Bond	Tracy	City of Quesnel, Wildfire Recovery Coordinator
Caldecott	Tim	FP Innovations, Provincial Research Leader
Christie	Jean	Lhtako, Referrals and Consultation Technician
Clancy	Jason	Tolko, Quesnel
Colombo	Emily	MFLNRORD, A/Reg Manager, Community Wildfire Recovery Branch
Courtney	Mark	Blue Collar Silviculture
Dells	Shawn	Pacific Bioenergy
Dockray	Jacqui	UNBC, Office of Research
Dunn	Ron	C&C Wood Products, VP Corporate Development
Erickson	Marlene	College of New Caledonia
Fouty	Amanda	FLNRORD, Regional
Gardner	Larry	West Fraser, VP Canadian Woodlands at West Fraser
Geoff	Payne	UNBC, VP Research
Goodison	Andrew	FP Innovations, Mgr Business Intelligence,
Grant	Gerry	Pacific Bioenergy/Nazbec
Gray	Bob	R.W. Gray Consulting Ltd., President
Gunter	Jennifer	BC Community Forest Association, Executive Director
Hammond	Jamie	Ministry of Jobs, Technology and Trade, ADM, International Strategy and competitiveness
Hannah	Ian	MFLNRORD, Quesnel District
Henry	Larry	MFLNRORD, Forest Tenures Team Lead
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Last Name	First Name	Organization, position
Hoffman	Tom	Regional Woodlands Manager, Tolko
Kenny	Joe	Pacific Bioenergy
King	Renata	Director, Business Development, NDIT
Kozuki	Steve	Forest Enhancement Society of BC, Executive Director
Krahn	Tai	C&C Wood Products
Kunkel	Titi	UNBC, A/Regional Chair, South Central
Labelle	Rhonda	CCATEC, Executive Director
Lewis	Kathy	UNBC
Lutes	Jeff	Blue Collar Silviculture
Maclauchlan	Lorraine	FLNRORD Forest Sciences (Forest Health)
Massier	John	CRD, Vice Chair, Electoral Area C director
McNaughton	Brian	Federation of BC Woodlots Associations, General Manager
Mycock	Jeff	Chief Forester, West Fraser
Naeth	Lee	FLNRORD, Resource Manager, Quesnel
Neufeld	Nicole	UNBC, Business Services
Nussbaum	Albert	Forest Analyst & Inv, MFLNRORD
Okabe	Allan	Kluskus Nation
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Pressey	Josh	MFLNRORD, District Manager, Quesnel
Ray	Christie	UNBC, Business Services
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Reich	Richard	Chair Forest Health, CNC
Roeser	Dominik	UBC Forest Engineering Dept.
Roodenburg	Laurey-Anne	UNBC Senate
Ross	Morgan	College of New Caledonia, Campus Principal
Russell	Patrick	MFLNRORD, Forest Tenures Manager
Sandland	James	MFLNRORD
Simpson	Bob	City of Quesnel, Mayor
Simpson	Mike	Fraser Basin Council, Senior Regional Manager, Thompson
Singbeil	Doug	Research Mgr - Process Engineering/BioEnergy, FP Innovations
St. John	Bruce	VP Innovation and Marketing, Forest Innovtion Investment Ltd
Steele	Don	Pacific Bioenergy

Last Name	First Name	Organization, position
Thompson	Chad	AVP, CNC
Vanderburgh	Ken	FLNRORD, Director, Regional Initiatives
Wimmers	Guido	UNBC
Wood	Lisa	UNBC

Appendix 4 – List of Acronyms

BEC – biogeoclimatic ecosystem classification

CCATEC – Cariboo-Chilcotin Aboriginal Training and Education Centre

CCLUP – Cariboo-Chilcotin Land Use Plan

CNC – College of New Caledonia

CWPP – community wildfire protection plan

FCI – Forest Carbon Initiative

FESBC – Forest Enhancement Society of BC

FFT – Forests for Tomorrow

FII – Forestry Innovation Investment Ltd.

FPPR – Forest Planning and Practices Regulation

FRPA – Forest and Range Practices Act

FSP – forest stewardship plan

GAR – Government Action Regulation

LIDAR – light detection and ranging

MDF – medium density fibreboard

MDWR – mule deer winter range

MFLNRORD – Ministry of Forests, Lands, Natural Resource Operations and Rural Development

MOTI – Ministry of Transportation and Infrastructure

NDIT – Northern Development Initiative Trust

OBSCR –Open Burning Smoke Control Regulation

OGMA – old growth management area

OSB – oriented strandboard

PEM – predictive ecosystem mapping

TSA – timber supply area

UBC – University of British Columbia

UNBC – University of Northern British Columbia

WIDC – Wood Innovation and Design Centre, UNBC

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