

Central Canada and Québec SIC
Climate Smart Forestry Regional Assessment
Montreal, Quebec
December 8, 2022



Contents

Introduction..... 2

Identifying Climate Change Conditions and Impacts..... 3

 Overview..... 3

 Regional Climate Conditions and Impact/Risk Identification 4

Risk and Vulnerability Assessments..... 5

 Overview..... 5

 Risk Assessment Process 5

 Assessing Risk 6

 Regional Risk Assessment and Prioritization 7

Identifying Adaptation Actions..... 7

 Overview..... 7

 Regional Adaption Actions..... 9

Conclusion 12

Appendix I Workshop Agenda 13

Appendix II Workshop Participant List 16

Appendix III Workshop Survey Results Summary 18

Appendix IV Full Workshop Risk Assessment Matrix..... 21

Appendix V Full Workshop Potential Adaptations List 22

Appendix VI Additional Resources..... 25

 Climate Data 25

 Climate Change Adaptation Tools and Reports 25

 Climate Change Adaptation Assessments 25

Introduction

The 2022 SFI Forest Management Standard includes the new “Climate Smart Forestry” Objective 9, which sets expectations for SFI-Certified Organizations related to climate change risk assessment, adaptation, and carbon management. Climate Smart Forestry Objective 9 also introduces new opportunities for engagement and collaboration via the SFI Implementation Committees (SICs).

To help SFI-Certified Organizations meet their requirements under Objective 9, SFI developed a [playbook](#) and hosted a national online workshop on March 31, 2022, to discuss how Climate Smart Forestry Indicators could be addressed collaboratively.

On December 8, 2022, SFI hosted an in-person and online workshop designed to help the Central Canada and Québec SICs to exchange ideas and provide some regional information for SFI-Certified Organizations, which they can use as a starting point for meeting Performance Measure 9.1

Performance Measure 9.1 Certified Organizations shall individually and/or through cooperative efforts involving SFI Implementation Committees or other partners identify and address the climate change risks to forests and forest operations and develop appropriate adaptation objectives and strategies. Strategies are based on best scientific information.

And Performance Measure 9.2

Performance Measure 9.2 Certified Organizations shall individually and/or through cooperative efforts involving SFI Implementation Committees or other partners identify and address opportunities to mitigate the effects associated with its forest operations on climate change.

The workshop was facilitated by Mark Partington, Manager, Transportation and Infrastructure, FPIInnovations. The goals of the workshop were to:

- Raise awareness of how climate data is developed and where it is available
- Improve knowledge of the methods to determine risk and aspects of probability and severity
- Share understanding of climate change adaptation, mitigation, and resiliency
- Develop a prioritized list of climate change impacts, risks, and vulnerabilities to forests and forest operations in the Central Canada and Québec SIC regions
- Create a list of climate change adaptation strategies and actions for SFI-Certified Organizations to consider to help them address priority climate impacts and, in some cases, offer mitigation opportunities.

The full agenda for the meeting can be found in [Appendix I](#).

SFI staff, contractors, and SIC members from Manitoba, Ontario, and Québec attended the workshop. *The list of workshop attendees can be viewed in [Appendix II](#).*

Before the workshop, attendees were asked to complete an online survey to gather some initial thoughts and observations related to climate change, the impacts of those changes on forests and forest operations, and practices in use now to help adapt to those impacts. **Summarized survey results are included in [Appendix III](#).*

Identifying Climate Change Conditions and Impacts

Overview

- A good starting point for understanding how climate will continue to change is examining what people are experiencing at ground level.
- The results of the online survey indicate that SIC members have observed several changes in climate and the impact of those changes in their local areas, including:
 - “severe weather events such as rain storms and increased severity of windstorms”
 - “flooding and fires”
 - “hot spells, wildfire, heavy snow events”
 - “extreme drought in summer 2021. Extreme rainfall in 2022”
 - “erratic weather events”
 - “high wind events, heavy rainfall amounts in very short periods of time, observed melting days above 0 Celsius in January/February and also longer periods of colder weather (daytime highs below -25 Celsius) in January/February months, and frequency of below 0 Celsius in the months of May/June has increased in the last few years”
 - "Red pine exposed to drought on hilltops are dying/dead. More frequent heavy wind downbursts blow over trees at various scales. Woodland pools beginning to dry sooner or not ever recover back to their "normal" water level. See vegetation shifting within them from being semi-aquatic to terrestrial. Deep frost not arriving on time to form winter roads”
 - "2014 local flooding- property damage; 2021-extremely dry summer, fire hazard. MNR enacted implementation order prohibiting most logging activities; 2022- local flooding. Broke record for high water that was set in 1950. late thaw and significant rainfall during frozen conditions were major contributors."
 - “Variation in water managements stresses, as well as additional stresses on key species like maple.”
 - “erratic weather and weather extremes”
 - “Augmentation de la température Moyenne » (increased average temperature)”
 - “Severe weather resulting in blowdown, fires etc.”
- It is important to be aware of the climate data and models available for your license area to help validate what people are seeing on the ground and support your vulnerability assessments.
- Regional, provincial, and national datasets are now available, including:
 - National
 - ClimateData.ca <https://climatedata.ca/>
 - Climate Atlas of Canada <https://climateatlas.ca/>
 - Regional
 - Quebec – Ouranos -Portraits Climatiques <https://www.ouranos.ca/fr/portraits-climatiques>
 - Ontario – Climate Data Portal <https://lamps.math.yorku.ca/OntarioClimate/>
 - Prairies – Prairie Climate Centre <https://prairieclimatecentre.ca/> (embedded in climateatlas.ca)
- There are various climate models utilizing various trajectories (known as Representative Concentration Pathways, RCP) of greenhouse gas concentrations. The more commonly reported RCPs include:
 - RCP2.6 = very stringent pathway, only one that keeps global warming below 2C.
 - RCP4.5 = intermediate scenario, with emissions declining in 2040.
 - RCP8.5 = “business as usual” emissions rise to the end of the century.

- The RCP8.5 model is commonly used in vulnerability assessments as the “worst-case scenario.”
- Standard temperature and precipitation projections for 2030, 2050, and 2080 are available.
- Temperature and precipitation averages and extremes are often reported; however, there is more confidence in the averages than the extreme predictions and the temperature than the precipitation predictions.
- Generally in Canada, precipitation is projected to increase, although summer rainfall may decrease in some areas, with less peak flows in the summer.
- As part of your vulnerability assessment process, it is important to relate changes in temperature and precipitation that are representative and meaningful to local forests and forest operations. These could include:
 - Dry conditions – as indicated by maximum annual average daily temperatures
 - Extreme flooding – as indicated by 20-year return period precipitation events
 - Sustained rainfall – as indicated by maximum annual 5 -day precipitation events
 - Snowfall accumulations – as indicated by total precipitation as snow
 - Free-thaw cycle – as indicated by total annual days with freeze-thaw cycling
 - Spring thaw – as indicated by total winter freezing degree days.
- There is some extreme event information available, but they are less accurate. For example, historical Intensity-Duration-Frequency (IDF) curves are graphical tools produced by Environment and Climate Change Canada that describe the likelihood of a range of extreme rainfall events. More information can be found here: <https://climatedata.ca/variable/>.

Regional Climate Conditions and Impact/Risk Identification

The workshop participants created an initial list of observed and expected climate conditions and identified several risks to forest health and forestry operations:

Condition	Impact
Flooding and washouts because of changing conditions during the winter and/or extreme storms	<ul style="list-style-type: none"> • Finding more washouts which leads to infrastructure damage – strains operations, and affects social, economic, and environmental operations. (E.g., 4 - one-in-100 year rainfall events in a couple of years; flooding of Hwy 105, communities stranded, foresters stranded) • Disrupts access and increases operational costs • Flooding of Hwy105, communities stranded, foresters stranded • Forest road infrastructure can become a focus for emergency management and not forest management
Increase in variability with frequency and intensity of wildfires	<ul style="list-style-type: none"> • Having to deal more with emergency forest fire management and not timber harvest • Effects on fiber supply
Warmer temperatures trend	<ul style="list-style-type: none"> • Increase pests, pathogens, and invasive species, e.g., LDD (Gypsy) Moth, emerald ash borer, spruce budworm • Effects on fiber supply • May expect to see more tree species become endangered – can impact timber supply
Variability in spring weather/thaw	<ul style="list-style-type: none"> • Difficult to plan spring planting • Unpredictable frozen ground conditions lead to issues with access • Having to start operations later than normal

Condition	Impact
Variability at certain key times of year (e.g., during winter conditions)	<ul style="list-style-type: none"> • Affects access • Difficult to schedule staff and contractors • Health and safety risks (e.g., ticks, fires, extreme heat, flooding) • Loss of the number of productive working days during every season, leads to higher operating costs
Trends of shorter and/or shifting seasons	<ul style="list-style-type: none"> • Lots of seasonal restrictions – sometimes can't get going until later in the fall, getting pushed into winter operations but winter conditions are getting more difficult to operate in • Affects staffing/contracting – can't offer consistent work anymore – harder to ensure contractor operations remain profitable • Can influence insect outbreaks • Can influence the timing of operations • Mills not getting the wood when they need/expect it • In some areas, experiencing longer winters (e.g., in MB) and/ or a shift in winter months and colder temps in the spring – having to extend the working winter season but delay the planting season • Experiencing warmer temperatures in September which affect our ability to collect seeds from species that normally shed later • Extended spraying in the fall • Hot summers affecting the ability to get brush work done – worker safety • Keeping tree markers working in the fall

Risk and Vulnerability Assessments

Overview

Risk Assessment Process

- The effects of climate change will vary greatly, and some will substantially impact forest ecosystems and forestry operations. A risk management framework can help to identify the most significant climate change impacts and vulnerabilities and prioritize management responses.
- Identifying climate change risks and vulnerabilities is a critical component of the adaptive management cycle.
- Although several methods have been developed (e.g., Edwards et al. 2015 <https://www.cfm.org/wp-content/uploads/2020/08/Climate-change-and-sustainable-forest-management-in-Canada-a-guidebook-for-assessing-vulnerability-and-mainstreaming-adaptation-into-decision-making-Report.pdf>), there is no standard approach.
- Although these assessments can be done at a national, provincial, and regional scale, the process of deciding what



Figure 5. Canada's adaptation cycle

Source: <https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/national-adaptation-strategy/full-strategy.html>

climate-smart adaptation actions to implement is very much an individual local organization approach.

- Assessments are also iterative processes, adjusted as needed or at regular intervals (e.g., yearly, bi-annually); assessments might start broad in scope and narrow down or might start narrow in scope and become broader.
- Completing the assessment process as a team, including managers, planners, operations, silviculture, etc., will help to prioritize risk and select appropriate climate-smart adaptations to implement.
- It is also important to capture any positive impacts of climate change in addition to adverse effects, as even positive effects may need to be adapted to.

Assessing Risk

Risk = Probability X Severity

- Risk** is the product of the **probability** (likelihood) of a negative climate event (hazard/impact) occurring and the **severity** (damage) of the consequence of that event.

Score	Probability
1	Improbable (unlikely to occur)
2	Remote (unlikely, though possible)
3	Occasional (likely to occur occasionally)
4	Probable (will occur in given time)
5	Frequent (likely to occur to be expected)

Probability

- The probability of an event occurring can be measured in several ways, for example:
- A probability score can be developed that represents the probability (likelihood) of the climate parameter occurring and exceeding the current design and performance levels of the forest and forest operations.

Severity

- Similarly, a severity score can also be developed.
- Note: that probability and severity scores are treated as independent variables that determine the risk scores. The consequences of an event (severity) are independent of the likelihood that the event will occur (probability).

Score	Severity
1	Negligible (remote possibility of damage)
2	Marginal (damage could occur but not serious)
3	Moderate (can result in serious damage)
4	Critical (can result in significant damage)
5	Catastrophic (extreme damage occurs)

Risk Matrix

- Probability and severity scores can be combined to create a risk matrix.

Severity	Catastrophic	Moderate Risk	High Risk	High Risk	Extreme Risk	Extreme Risk
	Critical	Low Risk	Moderate Risk	High Risk	High Risk	Extreme Risk
	Moderate	Low Risk	Low Risk	Moderate Risk	High Risk	High Risk
	Marginal	Negligible Risk	Low Risk	Low Risk	Moderate Risk	Moderate Risk
	Negligible	Negligible Risk	Negligible Risk	Low Risk	Low Risk	Low Risk
		Improbable	Remote	Occasional	Probably	Frequent
Probability						

Regional Risk Assessment and Prioritization

Considering climate change risks broadly across Manitoba, Ontario, and Quebec and across all SFI-certified organizations can provide a common understanding that individual organizations can use to refine based on their own circumstances. This regional risk assessment is designed to help focus (not limit) an individual organization's climate change efforts.

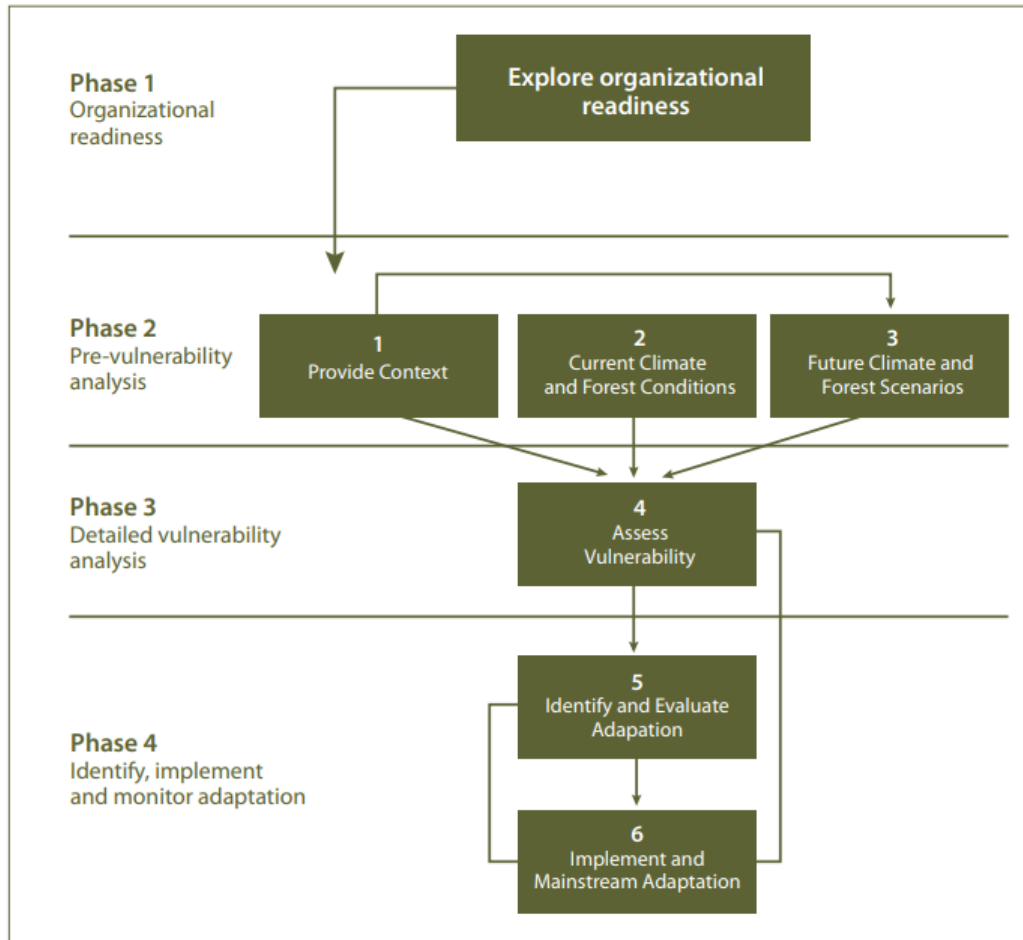
Workshop participants worked with the workshop facilitator to assess and prioritize some of the previously identified risks. The risk analysis results are below. *The complete assessment matrix can be found in [Appendix IV](#). A copy of the excel workbook used is available upon request.*

Climate parameters	Forest health, sustainability, planning, and operational considerations				
	Spring planting season	Water crossings	Wood supply	Safety risks	Loss of infrastructure (not roads) & equipment
Increased variable spring conditions	High Risk	N/A	N/A	N/A	N/A
Extreme rain events	Medium Risk	High Risk	High Risk	Medium Risk	Negligible Risk
Increased pests, invasives	N/A	N/A	High Risk	High Risk	N/A
Increased wildfires	Medium Risk	Medium Risk	High Risk	Extreme Risk	Extreme Risk

Identifying Adaptation Actions

Overview

- Adaptation in this context refers to any action that reduces the negative impact and vulnerability of forests and forest operations to climate change.
- Adaptation is a continuous and evolving process.
- Adaptations can be structural (direct changes to forest operations), which can be quickly implemented, but they can also be operational (policies and procedures) that typically take longer to implement.
- Adaptation action can also include soft strategies such as erosion controls or staff training or hard strategies that require higher capital and longer-term investments.
- Implementation can be short-term incremental and/or reactive strategies, or it can be through long-term proactive strategies.
- Adaptation builds resiliency – the ability and capacity to respond and adapt to the impacts of climate change.



Source: <https://www.cfm.org/wp-content/uploads/2020/08/Climate-change-and-sustainable-forest-management-in-Canada-a-guidebook-for-assessing-vulnerability-and-mainstreaming-adaptation-into-decision-making-Report.pdf>

Figure 0.1. The four stages and six components (indicated by green boxes) of adaptation to climate change in the context of sustainable forest management (adapted from Williamson et al. 2012).

- The results of the online survey indicate that SIC members have observed several changes in climate and the impact of those changes in their local areas, including:
 - “assisted migration”
 - “adjustments to shorter harvest seasons; adjustments to scheduling of operations such as road construction; seed tree trials, changes to larger culverts or bridge structures to accommodate higher peak flows, changes to road layout”
 - “installation of more bridges/larger diameter culverts, stockpiling both treelength and 8 foot hardwood, and more focus on harvest planning”
 - “Oversized culverts to accommodate more flow than projected in a 25year flow cycle. Blitz cone collection during bumper crop years to collect as much seed as possible due to bumper years becoming more sporadic.”
 - “Adapting normal culvert assumptions to accommodate a wider range of rain impacts”
 - “Entretien préventif des chemins forestiers” (preventive maintenance of forest roads)
 - “salvage operations to reduce fire risk in large damaged areas”

Regional Adaption Actions

The final portion of the workshop was dedicated to discussing adaptation and some associated mitigation strategies that could be implemented to address some of the top risks previously identified.

The following table summarizes the potential adaption actions identified. *A complete list of adaptations discussed can be found in Appendix V (a further list of adaptation actions is available in the [Menu of Adaptation Strategies and Approaches – Developed for forests](#)).*

Climate parameters	Forest health, sustainability, planning, and operational considerations				
	Spring planting season	Water crossings	Wood supply	Safety risks	Loss of infrastructure (not roads) & equipment
Increased variable spring conditions, milder, shorter winters, fluctuating winter temperatures	<ul style="list-style-type: none"> - Build more flexibility in your annual planting plans (e.g., contingency planning) 	<ul style="list-style-type: none"> - Responsive, well-equipped road management program (e.g., equipment more available) - Advanced all-season roads - Changing the timing of haul (e.g., night hauls) - Create ice roads 	<ul style="list-style-type: none"> - Doing more stockpiling - Stage wood on solid ground - Ramp up harvest production when conditions are favourable - Build more flexibility in your annual harvest plans (e.g., contingency planning) - Maximize spring/fall sites, and identify winter sites to support advanced planning and road building - Strategic logistics – contractors 	<ul style="list-style-type: none"> - Advanced all-season roads - Implement health and safety protocols (e.g., avoidance of compromised crossings) 	<ul style="list-style-type: none"> - Stage wood on solid ground

			<ul style="list-style-type: none"> assisting others in optimizing schedules - backhaul opportunities 		
Extreme rain events		<ul style="list-style-type: none"> - Apply road surface additives (e.g., clay into concrete) - Use high-floatation tires - Use appropriate size and type of culverts - Install washout barriers - Avoid flooded areas-use alternative routes - Use geotextiles on wet soils 	<ul style="list-style-type: none"> - Take a broader watershed management approach to promote increased water retention - Build more flexibility in your annual harvest plans (e.g., contingency planning) - Stockpile -Ensure prompt reforestation 	<ul style="list-style-type: none"> - Update emergency response plans, including evacuations - Implement health and safety protocols (e.g., suitable PPE and equipment) -Avoid flooded areas-use alternative routes 	
Increased pests, invasives			<ul style="list-style-type: none"> -Reduce fuel loads via (e.g.,) prescribed burns, stand thinning -Increase salvage harvest operations - Implement a clean equipment protocol -Prompt mobilization of effective 	<ul style="list-style-type: none"> - Implement health and safety protocols (e.g., standing dead trees, fires) 	<ul style="list-style-type: none"> - Change in salvage harvesting equipment (e.g., buncher heads) - Retool mill to adjust to salvage harvest

			<p>monitoring and education program</p> <ul style="list-style-type: none"> - Prompt mobilization of management program (e.g., spraying) -Ensure prompt reforestation 		
Increased wildfires	<ul style="list-style-type: none"> - Increased seed banks to support reforestation - Increased aerial seeding programs 		<ul style="list-style-type: none"> -Reduce fuel loads via (e.g.,) prescribed burns, stand thinning -Increase salvage harvest operations - Build more flexibility in your annual harvest plans (e.g., contingency planning) -Ensure prompt reforestation -- Implement forest management for a healthy, diverse forest (e.g., manage for mixed-aged stands) 	<ul style="list-style-type: none"> - Update emergency response plans, including evacuations - Implement health and safety protocols (e.g., standing dead trees, fires) - Avoid burning areas- identify and use alternative travel routes 	<ul style="list-style-type: none"> - Implement fire smart programs (e.g., build fire breaks around infrastructure and communities) - Change in salvage harvesting equipment (e.g., Buncher heads) - Retool mill to adjust to salvage harvest

Conclusion

This document is intended to serve as a resource for climate-smart forestry and does not constitute a complete list of potential climate change risks or adaptation actions. Identifying climate change risks and vulnerabilities is a critical component of the adaptive management cycle and should be completed as new information is available and/or on a regular basis.

Further resources related to climate data, climate change risk assessments, and climate change adaptation can be found in [Appendix VI](#).

Central Canada and Quebec SIC Regional Climate Change Workshop December 8th, 2022

Interfor office at 1100 René-Lévesque Blvd W,
Montreal, Quebec H3B 4N4

Or remote option:

Microsoft Teams meeting

Join on your computer, mobile app or room device

[Click here to join the meeting](#)

Meeting ID: 269 938 325 977

Passcode: 9tCmNq

[Download Teams](#) | [Join on the web](#)

PURPOSE & OBJECTIVES

The 2022 SFI Forest Management Standard includes a new Objective on “Climate Smart Forestry,” which sets expectations for SFI certified organizations related to climate change risk assessment, adaptation, and carbon management. The Climate Smart Forestry Objective also introduces new opportunities for engagement and collaboration via the SFI Implementation Committees (SICs). This regional workshop is designed to help the Central Canada and Quebec SICs to exchange ideas and provide some regional information for SFI certified organizations, which they can use as a starting point.

Specifically, this workshop will help the SICs to:

- Discuss potential climate change impacts to SFI certified organizations and SFI managed forests and develop a regional risk assessment
- Identify potential adaptation actions to address priority climate impacts
- Determine how SICs will share this information with SFI certified organizations

Outcomes:

- Raise awareness of where and how climate data is developed and available
- Improve knowledge of the methods to determine risk and aspects of probability and severity
- Share understanding of climate change adaptation, mitigation, and resiliency
- Develop prioritized list of climate change impacts/vulnerabilities for the Central Canada and Quebec SIC regions
- Create list of climate change adaptation actions for SFI certified organizations to consider

HOW TO PREPARE FOR THE WORKSHOP

1. Review climate change information for regions including Central Canada and Quebec SIC forests.

- a. Regional analysis: <https://changingclimate.ca/regional-perspectives/chapter/3-0/> (Ontario) / <https://changingclimate.ca/regional-perspectives/chapter/4-0/> (Manitoba) / <https://changingclimate.ca/regional-perspectives/fr/chapitre/2-0/> (Québec)
 - b. Climate data : <https://climatedata.ca/> (National) / <https://www.ouranos.ca/fr/portraits-climatiques> (Québec)
2. Review the [Climate Smart Forestry Objective](#) in the 2022 SFI Forest Management Standard
 3. Review the [SIC Playbook](#) on Climate Smart Forestry and associated webinar recording.
 4. Complete a short online survey.
 - a. <https://forms.office.com/r/taby3ES1ci>

WORKSHOP AGENDA

Note: All times approximate. Agenda will be adjusted to accommodate discussion.

- 9:00 **Introduction (Gordy Mouw - SFI)**
- Welcome & Introductions, workshop purpose, connection to SFI Playbook for Climate Smart Forestry, antitrust statement.
- 9:30 **Climate Conditions and Impacts – Overview (Mark Partington - FPIInnovations)**
- Review the importance of understanding climate variables and conditions, how they are determined, and how to use climate data to support climate change adaptation.
- 10:00 **Climate Conditions and Impacts – Identification (group discussion)**
- Create an initial list of the climate change variables, conditions and impacts that are of greatest concern for SFI certified organizations and SFI managed forests. Identify the changes in climate observed in recent years, the changes in climate forecasted to offer the most significant impacts, and identify the vulnerabilities in forest management that these changes may create.
- 10:45 **Break**
- 11:00 **Risk Assessments – Overview (Mark Partington - FPIInnovations)**
- Review general introduction to risk and vulnerability assessments.
- 11:15 **Risk Assessments – Identification (group discussion)**
- Understand which climate vulnerabilities create the most concerning risks to SFI certified organizations and SFI managed forests. Determine the probability of a climate condition occurring, the severity of the interaction of a climate condition and forest management, and generate risk ratings.
- 12:15 **Lunch**
- 1:00 **Climate Change Adaptation – Concepts (Mark Partington - FPIInnovations)**
- Review climate change adaptation approaches for forest management and the aspects of mitigation and resiliency.
- 1:30 **Climate Change Adaptation - Identification (group discussion)**

- Create an initial list of adaptation practices that SFI certified organizations could take to address the highest-priority risks due to climate change. Brainstorm possible adaptation practices and identify the opportunities, challenges, and capacity for each priority adaption practice

2:30 **Break**

2:45 **Climate Change Adaptation - Identification (group discussion) continued**

- Continue discussion

3:30 **Summarize & Next steps (Gordy Mouw - SFI)**

- Are there any big takeaways or 'ahas' from the discussion?
- Are there gaps or ideas we didn't discuss?
- How can we compile this information so individual certified organizations can carry the ball forward?
- Next steps

4:00 **Adjourn!**

Appendix II Workshop Participant List

Group	Organization	Last Name	First Name	Attendance
CCSIC	Abitibi River Forest Mgt Inc.	Liukko	Mike	In person
CCSIC	Algonquin Forestry Authority	Cumming	Gord	Online
CCSIC	Algonquin Forestry Authority	Dombroskie	Shaun	In person
CCSIC	AV Terrace Bay	Gerry	Joel	Online
CCSIC	Boundary Waters Forest Management Corporation	Armstrong	Ian	Online
CCSIC	Dryden Forest Management Co. Ltd.	Young	Steve	In person
CCSIC	Interfor (Eacom Timber Corporation)	Parzei	Stephanie	In person
CCSIC	Louisiana-Pacific Canada Ltd.	Nickel	Brian	Online
CCSIC	Miisun Integrated Resource Mgt Inc.	Rawn	Shannon	In person
CCSIC	Nipissing Forest Resource Mgt Inc.	Morneault	Andree	In person
CCSIC	Obishikokaang Resources Corp.	Alkins	Chantal	Online
CCSIC	Rainy Lake Tribal Resource Management Inc.	Huitikka	Mike	Online
CCSIC	Timiskaming Forest	Thuerig	Steve	In person
CCSIC	Timiskaming Forest	Yaskovitch	Shay	Online
CCSIC	Wagner Ontario Forest Management Ltd.	Purves	Steve	Online
CCSIC	Westfraser	Bodnar	Chris	Online
CCSIC	Weyerhaeuser	Wilkie	Matt	Online
Quebec SIC	Barrette-Chapais	Micolaud	Laura	Online
Quebec SIC	Barrette-Chapais	Chiasson	Denis	Online
Quebec SIC	Kenauk	Vanier	Robert	In person
Quebec SIC	Papiers White Birch	Gelinas	Charles-Antoine	Online
Quebec SIC	Consultant for Papiers White Birch	Blanchette	Nicolas	Online
Quebec SIC	Resolute	Bourque	Samuel	In person
Quebec SIC	Resolute	Vezina	Etienne	Online
Quebec SIC	West Rock	Gagnon	Louis-Serge	In person

SFI Inc	Contractor	Gingras	Bev	In person
SFI Inc	FPInnovations	Partington	Mark	In person
SFI Inc	SFI Inc.	Mouw	Gordy	In person
SFI Inc	SFI Inc.	Sleep	Darren	In person
Guest	PotlatchDeltic	Hoeft	Jaden	Online

Q7. Have you previously conducted or contributed to a climate change risk assessment for your SFI-certified forest?

A7. Yes 6, No 12

Q8. If yes, what has been your most impactful learning from that assessment?

A8:

- L'augmentation de la température moyenne semble être le risque qui a le plus d'impact.
- Pests and wildfire risks increase in all regions and are expected to have high impact to wood supply
- Preparation and planning for risks and the ability to adapt to climate change.
- That the assessments do not easily provide any roadmap for change
- Adaptation de nos activités et prévention

Q9. Have you previously implemented any climate change adaptation practices on your SFI-certified forest?

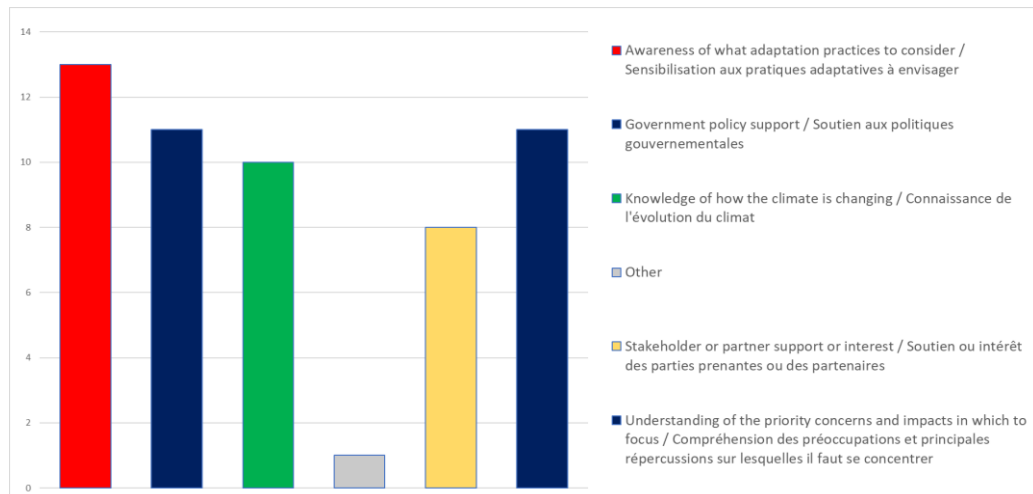
A9. Yes 8, No 10

Q10. If yes, what examples of adaptation practices have you implemented?

A10.

- Assisted migration.
- Following the Ontario Forest Policy Framework.
- Adjustments to shorter harvest seasons; adjustments to scheduling of operations such as road construction; seed tree trials, changes to larger culverts or bridge structures to accommodate higher peak flows, changes to road layout
- Installation of more bridges/larger diameter culverts, stockpiling both treelength and 8 foot hardwood, and more focus on harvest planning.
- Oversized culverts to accommodate more flow than projected in a 25year flow cycle.
- Blitz cone collection during bumper crop years to collect as much seed as possible due to bumper years becoming more sporadic.
- Adapting normal culvert assumptions to accommodate a wider range of rain impacts.
- Entretien préventif des chemins forestiers
- Salvage operations to reduce fire risk in large damaged areas

Q11. What barriers or challenges are a priority to address to effectively adapt your SFI-certified forest to climate change?



Appendix IV Full Workshop Risk Assessment Matrix

Forest health, sustainability, planning, and operational considerations						
Climate parameters		Spring planting season	Water crossings	Wood supply	Safety risks	Loss of infrastructure (not roads) & equipment
Increased variable spring conditions	Interaction?	Yes	N/A	N/A	N/A	N/A
	Probability	4				
	Severity	3				
	Risk	12	N/A	N/A	N/A	N/A
Extreme rain events	Interaction?	Y	Y	Y	Y	Y
	Probability	4	4	4	4	4
	Severity	2	4	3	2	1
	Risk	8	16	12	8	4
Increased pests, invasives	Interaction?	N/A	N/A	Y	Y	N/A
	Probability			5	5	
	Severity			2	3	
	Risk	N/A	N/A	10	15	N/A
Increased wildfires	Interaction?	Y	Y	Y	Y	Y
	Probability	4	4	4	4	4
	Severity	2	2	4	5	5
	Risk	8	8	16	20	20

Appendix V Full Workshop Potential Adaptations List

Climate Parameter	Impacts	Adaptations
Increased variable spring conditions, milder shorter winters, fluctuating winter temperatures	<ul style="list-style-type: none"> -Reduce wood supply -Longer winter ground restrictions -Access road failures, reduced access to lowest cost wood -Inconsistent work for contractors/unable to keep contractors employed -Shorter time frame for winter weights premiums on roads - Might be able to start equipment in milder conditions (positive impact) - Difficult to implement harvest plan / schedule - Health and safety issues (e.g., pushing stuck trucks) 	<ul style="list-style-type: none"> - Build more flexibility in your annual planting plans (e.g., contingency planning) -Responsive, well equipped road management program (e.g., equipment more available) - Advanced all-season roads - Changing the timing of haul (e.g., night hauls) - Create ice roads - Doing more stockpiling - Stage wood on solid ground - Ramp up harvest production when conditions are favorable - Build more flexibility in your annual harvest plans (e.g., contingency planning) - Maximize spring/fall sites, and identify winter sites to support advanced planning and road building - Strategic logistics –contractors assisting others to optimize schedules - backhaul opportunities - Advanced all-season roads - Implement health and safety protocols (e.g., avoidance of compromised crossings) - Train operators/staff to work with various machines - Share BMPS within the SICs -Changes needed to public policy (e.g., insurance limits, length of trailers, unmanned vehicles -Implement tire Pressure Control Systems on trucks
Extreme rain events	<ul style="list-style-type: none"> -Increased flooding and washouts -Increased erosion and sedimentation -Culvert and bridge failures -Loss of road fines -Increased soil rutting -Negatively impacts pollination -Increased road maintenance costs -Reduced access -Employment interruptions and operations curtailment -Health and safety issues -Impacts wood supply due to shutdowns -Place strain on other roads if roads have to be used as public access 	<ul style="list-style-type: none"> - Apply road surface additives (e.g., clay into concrete) - Use high-floatation tires - Use appropriate size and type of culverts - Install washout barriers - Avoid flooded areas -use alternative routes - Use geotextiles on wet soils - Use crushed rock on steep slopes to reduce gravel loss - Increased armouring on bridge abutments – controlled failures - Effective and efficient use of aggregate

		<ul style="list-style-type: none"> - Take a broader watershed management approach to promote increased water retention - Build more flexibility in your annual harvest plans (e.g., contingency planning) - Stockpile to react to road closures - Ensure prompt reforestation - Update emergency response plans, including evacuations - Implement health and safety protocols (e.g., suitable PPE and equipment) - Avoidance of flooded areas-use alternative routes
Increased pests, invasives	<ul style="list-style-type: none"> - Increased tree mortality - Increased fire risk - Increased fire risk - Loss of biodiversity - Loss of wood supply - Outcompeting native vegetation - Increased health and safety risks, blowdown standing dead trees, fires - Increased risk of listing species of risk - Increased costs related to control programs - Reduced wood quality/ reduced yields - Undesirable wood products - Increased mill liability - Reduces good summer ground - Increased cost of silviculture 	<ul style="list-style-type: none"> - Reduce fuel loads, via (e.g.,) prescribed burns, stand thinning - Increase salvage harvest operations - Accelerate harvests - Optimize age of harvest - Implement a clean equipment protocol - Identify (on maps and on the ground) areas where invasives occur - Prompt mobilization of effective monitoring and education program - Prompt mobilization of management program (e.g., spraying) - Ensure prompt reforestation - Implement supportive research - Share findings across tenures - Implement health and safety protocols (e.g., standing dead trees, fires), including more awareness and training for workers in these areas - Change in salvage harvesting equipment (e.g., buncher heads) - Retool mill to adjust to salvage harvest - Restrict movement of wood, increase public education - Deglobalize supply change to reduce spread - Increase government accountability for point source accountability (e.g., penalties)
Increased wildfires	<ul style="list-style-type: none"> - Disrupts FMP - Reduced wood supply including log supply - Infrastructure damage, including mill destruction, machine and equipment 	<ul style="list-style-type: none"> - Reduce fuel loads, via (e.g.,) prescribed burns, stand thinning - Increase salvage harvest operations

	<p>loss</p> <ul style="list-style-type: none"> - Increased insurance costs - Increased loss of production time (e.g., employees helping to create wood breaks) - Increased loss of silviculture investments - Increased road closures - Costs to move operations (e.g., camps) - Impacts to long-term conservation plans, including loss of conservation areas - Impact local wildlife -Health and safety issues for workers during and after fire (e.g., salvage logging, planting in burn areas) -Health and safety issues for communities -Increase in species that are resilient to fire (positive impact) - Potential for less invasives and ticks (positive impact) - Changes to hydrology - Water quality impacts - Cut off access for local communities - Reduced employment opportunities 	<ul style="list-style-type: none"> - Build more flexibility in your annual harvest plans (e.g., contingency planning) -Ensure prompt reforestation -Implement forest management for a healthy, diverse forest (e.g., manage for mixed-aged stands) - Update emergency response plans, preparedness and training, including evacuations - Implement health and safety protocols (e.g., standing dead trees, fires) - Avoid burning areas- identify and use travel alternative routes -Implement practices to remove salvage material to support planting - Implement fire smart programs (e.g., build fire breaks around infrastructure and communities, let hardwood renew near communities) - Change in salvage harvesting equipment (e.g., Buncher heads) - Retool mill to adjust to salvage harvest - Increased seed banks to support reforestation - Increased aerial seeding programs - Modifying and visibility of fire index and hazard ratings - Modifying industrial operating protocol (MIOP) implemented – ON - Implement public education programs - Update government policies for fire attack in provincial parks
--	---	---

Appendix VI Additional Resources

Climate Data

- National
 - ClimateData.ca <https://climatedata.ca/>
 - Climate Atlas of Canada <https://climateatlas.ca/>
- Regional
 - Quebec – Ouranos -Portraits Climatiques <https://www.ouranos.ca/fr/portraits-climatiques>
 - Ontario – Climate Data Portal <https://lamps.math.yorku.ca/OntarioClimate/>
 - Prairies – Prairie Climate Centre <https://prairieclimatecentre.ca/> (embedded in climateatlas.ca)

Climate Change Adaptation Tools and Reports

- National
 - NRCan Forest change adaptation tools <https://www.nrcan.gc.ca/climate-change-adapting-impacts-and-reducing-emissions/climate-change-impacts-forests/forest-change-adaptation-tools/17770>
 - Canada’s National Adaptation Strategy <https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/national-adaptation-strategy.html>
- Regional
 - Quebec - <https://changingclimate.ca/regional-perspectives/chapter/2-0/>
 - Ontario - <https://changingclimate.ca/regional-perspectives/chapter/3-0/>
 - Prairies - <https://changingclimate.ca/regional-perspectives/chapter/4-0/>

Climate Change Adaptation Assessments

- National
 - Climate Change and Sustainable Forest Management in Canada: A Guidebook for Assessing Vulnerability and Mainstreaming Adaptation into Decision Making <https://www.ccfm.org/wp-content/uploads/2020/08/Climate-change-and-sustainable-forest-management-in-Canada-a-guidebook-for-assessing-vulnerability-and-mainstreaming-adaptation-into-decision-making-Report.pdf>