Western Canada SIC – BC Region

Climate Smart Forestry Regional Workshop

Victoria, British Columbia

April 4, 2023

SUSTAINABLE FORESTRY INITIATIVE WESTERN CANADA
SFI-01150

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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 April 4, 2023, SFI hosted an in-person and online workshop designed to help the British Columbia Region Committee of the Western Canada SIC 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, FPInnovations. The goals of the workshop were to:

- Understand different perspectives on climate smart forestry, including those of Indigenous rights holders, federal/provincial governments, companies, academics, and others.
- Discuss potential climate change impacts to SFI-certified organizations and SFI-managed forests and prioritize climate change vulnerabilities.
- Better understand climate change forestry risks and identify potential adaptation actions to address priority vulnerabilities.

The full agenda for the meeting can be found in Appendix I.

SFI staff, contractors, SIC members, and staff from Natural Resources Canada 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. **This report summarizes the results of the pre-workshop survey and the discussions that occurred during the workshop. Information about climate data is also included in the report to aid WIC members in identifying climate change conditions and impacts.**

Summarized survey results are included in Appendix III.

**Workshop presentations and complete survey results are available upon request.*

Climate Smart Forestry in Support of Net Zero Emission Goals

During the workshop, Dr. Werner Kurz, Senior Research Scientist with Natural Resources Canada (NRCan), discussed the role forest management could have in reducing atmospheric carbon and reaching net zero emission goals in Canada. His full presentation can be viewed here: https://youtu.be/IjvZt0Eyq1E

Highlights of his presentation include:

State of Knowledge About Climate Change

- Pace and scale of the current climate actions are insufficient to tackle climate change.
- Currently, the world is on par for warming of more than 3°C.
- To limit global warming at any temperature, we must reach net zero emissions and net negative emissions are required later this century.
- **Limiting warming involves rapid, deep and immediate GHG emission reductions.**
- **We still have options, but the longer we delay action, the more severe the consequences will be.**

Forest Carbon Dynamics

- Forests are part of the natural biotic carbon cycle.
- Fossil fuels are not part of this natural cycle – CO_2 emitted by burning fossil fuels is additive to atmospheric carbon.
- Greatest sources of CO_2 emissions include the burning of fossil fuel and forest fires.
- Carbon sinks include the atmosphere, lands, and oceans – globally, ~30% of fossil fuel carbon is taken up by forests.
- C stock = how much C is contained within something (often referred to as a "pool"); C flux = how much C is transferred between pools.
- In the context of climate change mitigation – **we need to understand the role of forests as mechanisms to remove C02 from the atmosphere,** and it is the rate of carbon removal (flux) that matters in addition to the C stocks in forests.
- Forest carbon balance = production of all organic matter – release of carbon through decay.
- Disturbances can release C into the atmosphere or transfer C to forest products.
- A forest that removes CO_2 is considered a sink.
- Managed forests can be sinks even if C stocks do not increase.
- Carbon balance is age dependent – forests are C sources the first years after disturbance, strong C sinks at an early age, sequestration declines with age, but C stocks increase. The time when a forest becomes a max sink differs from the time when a forest becomes a max stock. Time scale differs among forest types.
- On Vancouver Island, converting old-growth to managed forests reduces landscape-level C stocks but increases subsequent sinks.
- Cumulative Harvest + Biomass C increase = C removed from the atmosphere; how much of harvested C is returned to the atmosphere depends on wood use.
- Transition from natural to managed disturbances results in lower C stocks even if fire and harvest have the same rotation length.
- As the proportion of total harvest in second growth increases, the reported C balance will improve.

BC Wood Use and Climate Change Mitigation

- **How we use harvested wood and biomass matters**
- ~33% of wood harvested since 1990 is still stored in products.
- ~28% stored in landfills (reported as emitted).

- Analysis indicates the most significant reduction in GHG emissions would occur if all wood extracted from the forest went into long-term products; emissions would increase if all wood were used as biofuels to meet the fuel demands of BC.
- Structural building products are the best for carbon retention.
- It is important to pay attention to how we handle wood waste.
- Mitigation analyses require a systems perspective including forest ecosystem carbon, harvested wood product carbon, and changes in emissions from substitution benefits relative to a base (business as usual) case.
- Mitigation options in Canada include restoration of forest cover, improved forest management, and avoided forest conversion.

Climate Change Impacts

- **Forests are at risk from climate change.**
- Climate change impacts are and will be regionally differentiated.
    - Enhanced or reduced growth and mortality rates
    - Shifting vegetation zones
    - Increased disturbances
    - Increased decomposition rates
    - Thawing permafrost
- There is a slow C uptake by forests but fast releases due to forest fire.
- We are already experiencing temperature increases, especially in northern regions.
- Shifting climate niches (latitude or elevation) causes maladaptation, stress and mortality.
- Productivity may increase at the northern (high elevation) boundary.
- Objective 9 of 2022 SFI standards call for growth and yield modelling to periodically update inventories and make projections. However, no growth and yield models produced by governments in Canada are sensitive to changes in environment or climate change.
- Work is ongoing to develop operational climate-sensitive growth and yield models, but it is very challenging because of the wide range and complexity of responses and uncertainties of project climate changes.
- Climate change will alter the distribution and area of ecosystems, including the transition from forest to non-forest.
- Biggest stressors in the BC interior -lots of tree species dying, mountain pine beetle, forest fires.
- Recent BC wildfire emissions were 2 or 3 times the emissions from all other sectors in BC.
- **Reducing wildfire emissions is very important.**

Forest Management Mitigation Options

- The mitigation objective is to increase the net sinks in forests and to reduce emissions through wood use – however, this does not necessarily mean increasing forest C stocks – we do not want to increase C stocks in areas already at risk of forest fire.
- Requires active management to increase forest health, biodiversity, and resilience to climate change.
- Intensive forest management can capture mortality through thinning and reduce losses from decay.
- Need to reduce slash pile burning.
- Continuous forest cover management may reduce the magnitude and during of forests as C sources (e.g., reduce slash, improve survival of remaining stand, increase planning success, improve forest health).
- Ten steps toward forest sector mitigation

1. Improve GHG balance: increase sinks (grow more trees faster) and reduce sources (thinning to capture mortality and fuel management.
2. Avoid land use change (deforestation).
3. Use harvested trees first for long-lived wood products.
4. Maximize carbon retention in wood products and reduce wood waste at every stage.
5. Maximize avoided emissions through wood use.
6. Do not burn residues or waste unless energy is captured.
7. Conserve forests in areas of high conservation value and of low risk of natural disturbance.
8. Anticipate climate change impacts and align mitigation and adaptation objectives.
9. Monitor the consequences of carbon management actions.
10. Obtain public support to use the forest sector in climate change mitigation strategies.

Discussion highlights:

- All NRCan climate-related models are fully spatial to 1ha; in some areas there is a 30m resolution. However, we have not achieved strong predictive models of mortality and tree growth related to climate change.
- Some of the process models that have been developed have different outcomes, so ongoing research is needed. The models need to be fully spatial and transparent; to do this, the data needs to be publicly available.
- There are areas in the country where forests are doing better than others – climate change impacts are less and/or forests are more resilient. However, tipping points may occur, where forests become less resilient at some point.
- Dramatic changes are coming; past events will not work well for informing the future. It is difficult to adapt today for future conditions.
- Work is going on in the US and Canada to try to make model methodology similar.
- In terms of mitigation, depending on local conditions, continuous forest cover may be a better alternative than clear-cutting. However, more research is needed to demonstrate the outcomes of different silviculture techniques.

Resources related to this presentation include:

- https://cfs.nrcan.gc.ca/authors/read/13977
- https://scholar.google.ca/citations?user=nhemay8AAAAJ&hl=en
- https://cfs.nrcan.gc.ca/publications?id=40710
- https://www.ipcc.ch/report/sixth-assessment-report-cycle/
- https://www.globalcarbonproject.org/carbonbudget/
- https://www.sciencedirect.com/science/article/abs/pii/S0378112708002235
- http://ibfra.org/wp-content/uploads/2022/01/rapport-2021-11-sustainable-boreal-forest-management-challenges-and-opportunities-for-climate-change-mitigation-002-1.pdf
- https://d1ied5g1xfgpx8.cloudfront.net/pdfs/37881.pdf
- https://link.springer.com/article/10.1023/B:MITI.0000004486.62808.29
- https://cbmjournal.biomedcentral.com/articles/10.1186/s13021-021-00193-4
- https://link.springer.com/article/10.1007/s11027-023-10055-8
- https://www.science.org/doi/10.1126/sciadv.abd6034
- https://pics.uvic.ca/projects/wildfire-and-carbon

SFI-Certified Organizations Perspectives on Climate-Smart Forestry

Workshop attendees from SFI-Certified Organizations shared some initial perspectives on climate change adaptation activities in general and on the Climate Smart Forestry Objective 9 of the 2022 SFI Forest Management Standard. SFI-Certified Organizations indicated that:

- The new objective in the standard was the impetus for some organizations to bring all their teams, programs, and practices related to climate change under one umbrella and to look at those different pieces wholistically.
- Some organizations have formed teams of staff from different departments to work together on, for example, carbon emissions, climate change adaptation, and climate change mitigation.
- The work being done in support of Objective 9 has helped teams to communicate their work to the rest of their companies.
- One organization indicated that a climate action plan was developed in 2015; however, the plan was more aspirational than practical as they lacked the resources to implement it. Objective 9 presents an opportunity to action the plan. A gap analysis was done to compare the plan with Objective 9, and they did not fully align, so there is some work to do to meet the requirements of the Objective.
- A few organizations have started looking at carbon emissions as part of their environmental, social, and governance (ESG) reporting – some to Scope 3. These organizations are considering the full life cycle of timber to understand their products' role in carbon mitigation.
- One organization mentioned that it was in the process of connecting the requirements under the 2022 SFI standards to its ESG reporting goals.
- Organizations have been adapting to changing climate (including drought and flood conditions) for a while without labelling those actions as such. Objective 9 has helped companies recognize these actions as adaptation practices.
- Some of the mitigation or adaptation actions used by organizations include: climate-based seed transfer, assisted migration, prompt reforestation, full fibre utilization, limiting the burning of slash piles, and improving water crossings.
- One organization mentioned downscaling their regional work to incorporate climate change information on the ground, using, for example, PCIC Climate Explorer. They have been asking operations staff what information they need on the ground to help them adjust to climate change conditions.
- One organization mentioned that they report on their climate change mitigation and adaptation practices within their yearly sustainability report.
- Several organizations mentioned that they had gone through or were currently undertaking a climate change vulnerability assessment.
- Several organizations have gone through their first audit related to the 2022 SFI Forest Management Standard.
    - One organization mentioned that most of the discussions with the auditor concerned monitoring, specifically who should be responsible for monitoring on public land in British Columbia. The auditor felt the company should monitor, and the company felt it would be redundant if they monitored as the government was already doing so.
    - A few organizations felt that the requirements were challenging for smaller organizations that work at a smaller scale and/or have volume-based tenure. They felt it was easier to develop strategies and implement practices at the site level, but landscape-level carbon accounting was more challenging.
- Some organizations indicated that it was difficult to implement innovative approaches on volume-based tenures where the government dictates most of the planning and practices.

- Several organizations indicated that government policy often presented a barrier to implementing climate-smart forestry.

WCSIC coordinators mentioned they were hoping to learn how the SIC could help support the work of individual organizations related to climate-smart forestry. It was suggested that perhaps the biophysical components of a vulnerability assessment could be done through the SIC.

SFI staff indicated:

- They have cross-walked the 2022 SFI Standards to some of the ESG reporting frameworks and are happy to share that information with companies.
- SFI does have regular discussions with auditors and is working to understand what the issues currently are, particularly in relation to climate-smart forestry.
- They would like to have a clearer understanding of all the policy issues so they are better equipped to help find solutions to the problems.

Regional Climate Change Risk Assessment and Adaptation

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 impacts of climate change may differ in different areas of BC. For example, forest managers in southern BC may have different experiences relating to climate change than forest managers in northern BC and forest managers in coastal BC. The results of the online survey indicate that BC Region WIC SIC members have observed several changes in climate and the impact of those changes in their local areas, including:

- "Heavy rainfall events outside of usual season, more frequent extreme heavy rainfall events, drought & heat dome, wildfire season starting earlier & more extreme."
- "Impacts from wildfires during the summer months".
- "Drought and heat dome impacts to tree plantations".
- "Warmer winters, more freeze/thaw, increase in heavy precip/wind events over shorter time periods, more winter precipitation falling as rain, variable winter temperatures."
- "Drought frequency, extreme weather events (temperature, precipitation, wind.)
- "Drought events affecting seedling survival, extreme weather events affecting transportation routes, shorter freezing days for winter harvesting access, heavy rain events that cause siltation into fish bearing streams."
- "Increased drought and fire severity".
- "Increase in beetle populations and impacts."
- "Hard to say if this is decadal trends or climate trends. Cedar dieback as an example."
- "Unprecedented heat dome 2021. Reduced snowpack at higher elevations."
- "Increased wildfires".
- "Landslides, more rain events, volatile weather changes".
- "Extreme weather events".
- "More freeze-thaw cycles, more occurrences of severe weather events."
- "Increased frequency of severe winter storms, lengthened summer droughts."
- "Largescale fires, heat domes".
- "Floods & fires that have impacted access to First Nation communities and Traditional Territories & resources, drought".

Generally, precipitation is projected to increase in Canada, although summer rainfall may decrease in some areas, with fewer peak flows in the summer. However, 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
  - Pacific Climate Impacts Consortium (PCIC)
    - https://pacificclimate.org/analysis-tools/pcic-climate-explorer
    - https://pacificclimate.org/analysis tools/plan2adapt

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 (commonly used in vulnerability assessments as the "worst-case scenario").

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.

Regional Climate Conditions and Impact/Risk Identification

Using the information collected from the pre-workshop survey and during workshop discussions, a list of observed and expected climate conditions in British Columbia was developed and several risks to forest health and forestry operations were identified.

Condition	Impact
Increase in drought period intensity and length	• May reduce seedling survival • May reduce effectiveness of reforestation efforts • Reduce planation growth and survival • Contributes to increased wildlife risk and pests • Reduce stream flow (+heat) that negatively impacts fish populations
Increase in extreme precipitation events outside of usual season	• Challenges with timing of operations to minimize impacts on soils and water • Landslides • Increase in erosion and siltation into fish-bearing streams • May disrupt forest operations • Negative impact on human safety • Increase peak flow events and flooding– negative impact on roads, road infrastructure and terrain stability • Increase in winter rain or snow events impacting infrastructure • Multiple impacts on local communities, especially First Nation communities
Increase in variability with frequency, intensity, and size of wildfires	• Infrastructure damage • Negative impact on health and safety • Negative impact on fibre supply • Shorter operating window due to higher fire risk • Multiple impacts on local communities, especially First Nation communities • Increase in fire salvage operations
Warmer temperatures trends / Heat domes	• Increase damage to forests by pests, pathogens, and invasive species (especially those species 'temperature limited' under normal climatic conditions) • May reduce effectiveness of reforestation efforts • May disrupt forest operations • Negative impact on human safety • Tire blowouts because of heat
Shifting and variable season length	• Wildfire season starting earlier than normal/ difficult to predict wildfire season • Difficult to predict winter operating season • Reduced number of days with good winter harvesting conditions. • Wetter spring conditions increase the risk of fungus and rust infections • Earlier spring thaw contributing to road restrictions and ability to build inventory before breakup • Shorter and more challenging hauling season, increased maintenance costs, increased soil disturbance
Increased wind events	• Health and safety • Reduced timber supply

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 and although several methods have been developed (e.g., Edwards et al. 2015 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), there is no standard approach.

Risk assessments can be done at a national, provincial, and regional scale, however the process of deciding what climate-smart adaptation actions to implement is very much an individual local organization approach. 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.

Assessments are 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.

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.

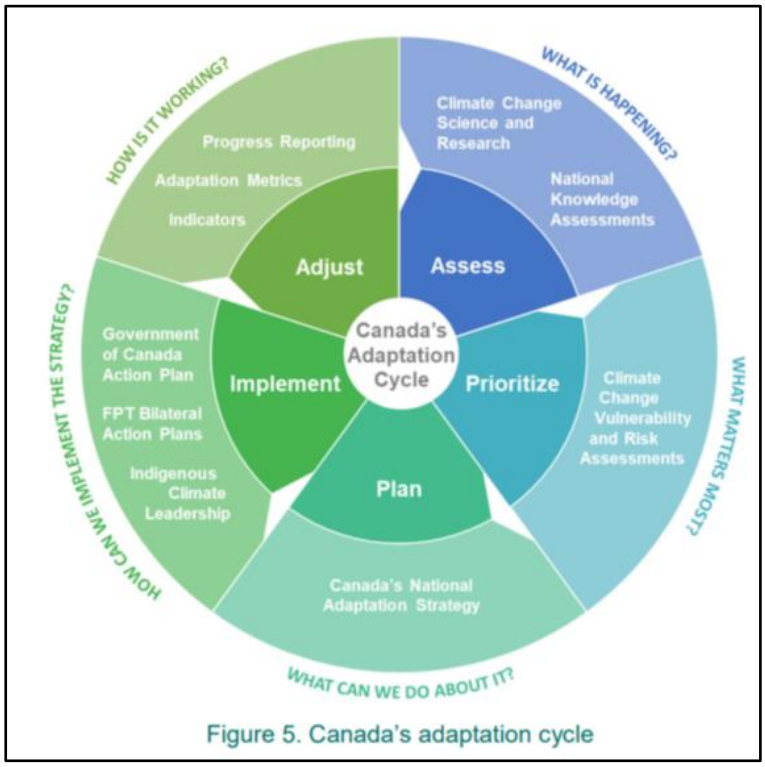


Figure 5. Canada's adaptation cycle

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

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: 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

The results of the pre-workshop survey indicated that several SFI-certified organizations in British Columbia have completed or are in the process of completing a climate change vulnerability assessment (CCVA). Some organizations have not yet begun a risk assessment process. Organizations that have or are in the process of completing a CCVA offered, through the pre-workshop survey or during workshop discussions, these learnings:

- Build your CCVA team before you start the process.
- Bring people with different roles and perspectives across the company together.
- Roll out the results of the process focusing on what they mean to the company, the team, and the individual.
- People are eager to discuss the process and do the work.
- The sooner you communicate and engage with different teams across the company, the better.
- The process needs to be iterative. Consider starting small/simple and expanding/building with experience.
- Process is challenging for companies with operations in different geopolitical landscapes. Risks and adaptations may differ in different areas (e.g., Coastal, Southern or Northern British Columbia).

Considering climate change risks broadly across British Columbia and across all SFI-certified organizations can provide a common understanding that individual organizations can use to refine based on their own circumstances. This preliminary 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 begin to assess and prioritize some, but not all, of the previously identified risks. The preliminary risk analysis results are below. SFI-certified organizations may wish to complete this analysis at a finer regional scale, e.g., coastal, southern, and northern regions of British Columbia.

A copy of the Excel workbook used is available upon request.

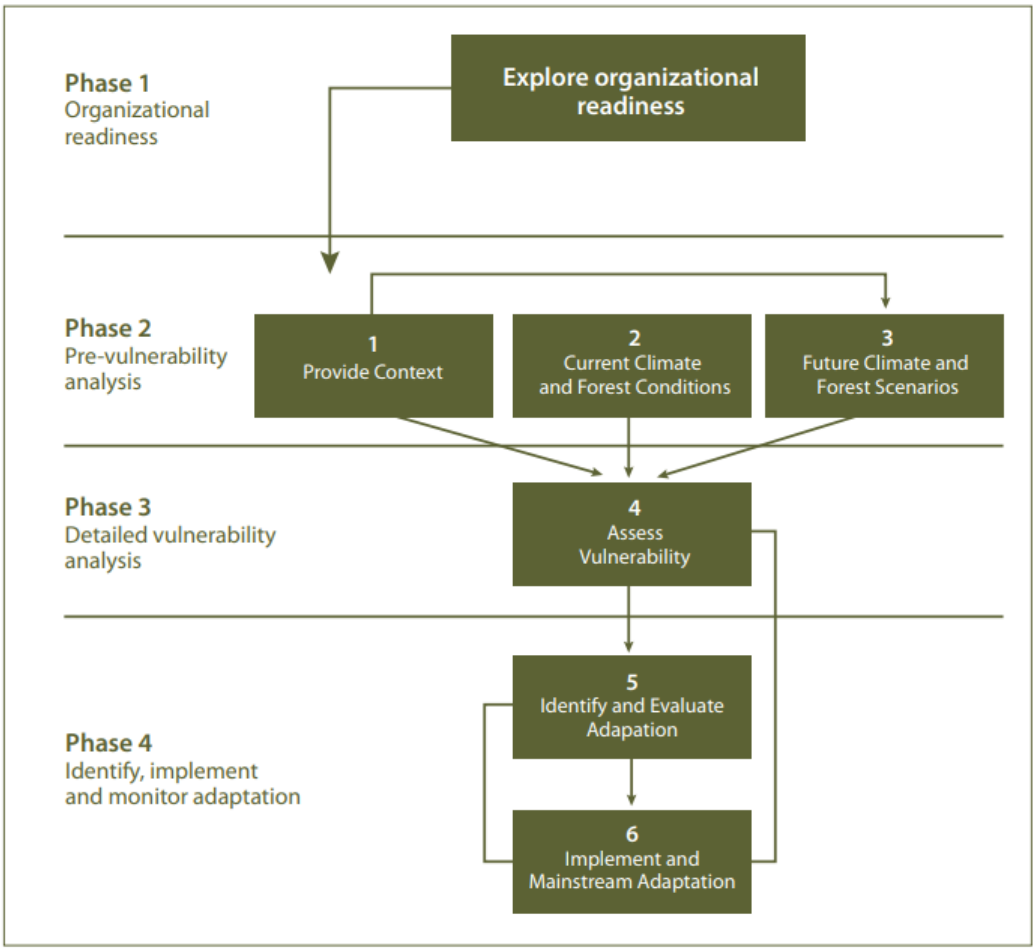
Climate parameters	**Forest health, sustainability, planning, and operational considerations**			
	Water crossings small	Safety of staff resources	Transportation of fibre	Regeneration success
Drought	Not assessed	Not assessed	Not assessed	Not assessed
Extreme precipitation events	High Risk	Not assessed	Not assessed	Not assessed
Warmer temperatures / heat domes	High Risk	Not assessed	Not assessed	Not assessed
Increased wildfires	Not assessed	Extreme Risk	Not assessed	Not assessed
Shifting and variable season length	Not assessed	Not assessed	Not assessed	Not assessed

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. It 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.

The diagram below is an example of a process organizations can implement as part of a sustainable management approach to climate smart-forestry.



Source: 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

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).

Regional Adaptation Actions

Using the information collected from the pre-workshop survey and during workshop discussions, a preliminary list was compiled of some adaptation strategies and actions that could be implemented to address some of the top risks previously identified. *(A further list of adaptation actions is available in the Menu of Adaptation Strategies and Approaches – Developed for forests)*

Roads related actions

- No new roads
- Increasing infrastructure resilience through the use of larger culvert sizes where needed
- Proactively improving road/bridge infrastructure
- Deactivating poor-performing culverts
- Use of road matting to aid with hauling on non-frozen roads
- Higher grade roads
- Better water management on in-block roads (including deactivation)
- Continuous forest cover management practices
- Hydrology research and monitoring
- Watershed assessments and research

Fibre access and transportation related actions

- Winter reload yards for timber transportation
- Satellite sort yards
- Adjusted harvest scheduling (satellite yards, spring decking)

Silviculture success related actions

- Adjust the timing of spring planting
- Replanting (vs revegetating)
- Prompt reforestation
- Utilization of selective tree breeding to promote the use of insect and rust-resistant stock
- Alternate/diverse/mixed species selection for reforestation
- Climate change informed species selection
- Climate-based seed transfer (CBST)
- Full fibre utilization
- Assisted species migration research and trials
- Additional retention for shade, riparian, vertical structure, screening, and wildlife corridors
- Partial cutting
- Thinning
- Retention of more deciduous trees

Wildfire management related actions

- Prescribed burning/cultural burning
- Enhanced (beyond legal requirements) operating restrictions during wildfire season
- Wildland Urban Interface wildfire resilience treatments
- Fire weather determination
- Adverse weather monitoring
- Weather station network expansion (including snowpack)

Invasive species related actions

- Prompt reaction and salvage planning following wind and wildfire events to limit the buildup of insect pest populations
- Deployment of funnel traps to limit the spread and increase aggregation of insect pests
- Active monitoring of forest health, including use of drones

Climate-Smart Forestry Challenges, Opportunities, and Next Steps

During the workshop and as part of the pre-workshop survey, participants mentioned several challenges and opportunities related to implementing climate-smart forestry.

SFI-certified organizations:

- Interested in learning from each other, but recognize there can be limitations to doing so (e.g., location and size of operations).
- Indicated that the landscape scale of the issue can be daunting.
- Suggested it would be helpful if climate smart resources could be specific to location, such as coastal, interior, southern, or northern British Columbia.
- Suggested it would be helpful if the information collected during individual organizations' CCVAs could be somehow shared with other companies. Is collating and sharing this type of information and other relevant data something SFI can lead/encourage/support?
- Would like to be proactive versus reactive, but challenging due to uncertainties related to weather, government policies, economics, etc.
- Concerned about lag times – research takes time, don't know the results of some of the actions we take now until 20+ years from now.
- Indicated baseline understanding, research, and monitoring is needed related to:
    - forest hydrology (droughts, low flows and peak flows),
    - reforestation (alternative species, seed deployment, timing),
    - weather (fire weather, adverse weather),
    - wildlife (how to predict, prevent, manage, react, adapt)
    - effectiveness and economic costs of implementation of mitigation or adaptation practices
- Interested in knowing how Indigenous knowledge will be implemented as part of climate-smart forestry processes and practices.
- Interested in knowing what funding is available to support testing and adoption of mitigation and adaptation strategies and actions.
- Would like support related to quantifying GHG emissions.
- Indicated that staffing (time, expertise was a limiting factor for completing assessments
- Reported that how stumpage fees are calculated – can limit harvest method options

WCSIC:

- The WCIS has a diverse membership, including companies operating in different provinces and landscapes. Thus, it is challenging to meet the needs of all the WCSIC members.
- Because the WCSIC membership is so diverse, the WCSIS focused on assembling a generic list of tools based on different provinces. A climate resources package was published, including resources and practices. These resources were meant to be a starting place for companies. https://wcsic.ca/
- The WCSIC is interested in learning how they can support climate-change forestry; they are looking for suggestions and volunteers.

SFI:

- Has created a playbook related to climate-smart forestry and facilitated regional SIC workshops.
- Will develop a bi-national report for public consumption based on the regional SIC workshop reports.
- Is interested in learning if a report or series of reports related to climate-smart forestry BMPS would be helpful. If so, what should those reports look like (e.g., risked-based themes?).
- Will be hosting more climate-smart forestry related conversations at the 2023 Conference https://forests.org/conference/ .
- Is interested in knowing what they can do at the national level to support the work of the SICs.

Conclusions

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 IV.

Appendix I Workshop Agenda

BC Region SIC Climate Smart Forestry Workshop
April 4, 2023, 9:00 am - 4:00 pm
Pacific Forestry Centre, 506 Burnside Road West, Victoria, BC
Remote option: **https://forests.zoom.us/j/6938775819**

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 members of the British Columbia (BC) SIC exchange ideas and provide regional information for SFI-certified organizations, which they can use to implement climate adaptation actions.

Specifically, this workshop will help the SIC members/SFI-certified organizations to:

- Understand different perspectives on climate smart forestry, including those of Indigenous rights holders, federal/provincial governments, companies, academics, and others
- Discuss potential climate change impacts to SFI-certified organizations and SFI-managed forests and prioritize climate change vulnerabilities
- Better understand climate change forestry risks and identify potential adaptation actions to address priority vulnerabilities

Outcomes:

- A ranked list of climate impacts and vulnerabilities for the BC region
- An initial list of adaptation actions for SFI-certified organizations to consider

WORKSHOP PRE-WORK

1. Respond to a short survey no later than Thursday, March 30 to share your concerns and questions
2. Review climate change impacts for BC region.
    a. Climate data: https://climatedata.ca/
    b. Climate data and analysis: https://pacificclimate.org/analysis-tools/plan2adapt/
3. Review the Climate Smart Forestry Objective in the 2022 SFI Forest Management Standard.
4. Review the SIC Climate Smart Forestry Playbook (see right side under "Documents")

FACILITATOR

- Mark Partington, Manager, Transportation and Infrastructure, FPInnovations

AGENDA

Note: All times are Pacific time and are approximate. Agenda may be adjusted to accommodate discussion.

8:30 **Coffee and light breakfast**

9:00 **Welcome**, **Introductions, Indigenous Land Acknowledgement -** Kathy Abusow, President and CEO, SFI
Review meeting goals, SFI Climate Smart Forestry requirements, and agenda/outcomes.

9:15 **Climate Smart Forestry in support of net zero emission goals** – Werner Kurz, Senior Research Scientist, Natural Resources Canada
Climate change impacts are projected to adversely affect the ability of BC forests to contribute to land sinks. Can forest management and the use of wood products contribute to future emissions reductions?

10:00 **Dialogue – Sharing of Information and Experiences** (group discussion)
Review results of pre-workshop survey, discuss the climate change variables, conditions and impacts that are of greatest concern for SFI certified organizations and SFI managed forests, and share experiences and actions to date relative to advancing climate smart forestry in BC.

10:45 **Break**

11:00 **Risk Assessments – Overview** (Mark Partington)
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.

12:00 **Lunch (provided)**

1:00 **Climate Change Adaptation – Concepts** (Mark Partington)
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)

3:30 **Summarize & Next steps** (SFI staff)
Review key takeaways, gaps for further analysis, products, and next steps.

4:00 **Adjourn**

Appendix II Workshop Participant List

Organization	Last Name	First Name	Attendance
Atco Wood Products	Hiebert	Nancy	Online
Babine Forest Products	Bysouth	Doug	Online
BC Timber Sales	Brownie	Kerri	In person
BC Timber Sales	Chessor	Laura	In person
Canfor	Bock	Kristine	Online
Canfor	Wan	Ivy	In person
Canfor	Zhu	Fred	In person
Conifex	Peterson	Mike	Online
Dunkley Lumber	Coffey	Erin	Online
Dunkley Lumber	Cover	Jeremy	Online
Gilbert Smith Forest Products Ltd.	Huber	Nicole	Online
Gorman Group	Hardy	Randy	Online
Interfor Corporation	Sonnenburg	Kai	In person
Interfor Corporation	Waterous	Randy	Online
J.H. Huscroft Ltd.	Muller	Heidi	Online
Louisiana-Pacific Corporation	Curtis	Sarah	Online
Manulife Investment Management	Merritt	Matthew	Online
Mosaic Forest Management	Beleznay	David	In person
Mosaic Forest Management	Hudson	Molly	In person
Mosaic Forest Management/University of Victoria	Paquette-Struger	Ben	In person
Sinclar Group Forest Products	Dillabaugh	Les	Online
Skeena Sawmills	Hodgins	Doug	Online
Skeena Sawmills	Reiter	Mark	Online
Stuwix Resources Joint Venture	MacDonald	Dennis	Online
Tolko	Vercholuk	Trina	In person
Upper Similkameen Indian Band	Marton	Mark	Online

Organization	Last Name	First Name	Attendance
Zimmfor	West	Jill	Online
West Fraser	Hale	Janelle	Online
West Fraser	Vandergaag	Colin	Online
West Fraser Mills	Johnson	Sara	Online
West Fraser Mills	van der Giessen	Jaret	Online
Western Forest Products	van Niejenhuis	Annette	Online
Weyerhaeuser Company Limited	Drobe	Brian	Online
UBC Faculty of Forestry	Bull	Gary	In person
NCASI	Solarik	Kevin	Online
Natural Resources Canada	Kurz	Werner	In person
Natural Resources Canada	Xie	Sheng	Online
Contractor	Gingras	Bev	In person
FPInnovations	Partington	Mark	In person
SFI Inc.	Abusow	Kathy	In person
SFI Inc.	Block	Nadine	In person
SFI Inc.	Cooper	Lauren	Online
SFI Inc..	Hamilton	Healy	Online
SFI Inc.	Macintosh	Gregor	In person
SFI Inc.	Mouw	Gordy	In person
SFI Inc.	Sleep	Darren	In person
SFI Inc.	Wagman	Zac	Online

Appendix III Workshop Survey Results Summary

Q1. Please indicate your position/title within your company.

A1.

BC Forest Stewardship and Policy Superintendent
Certification Coordinator
Certification Officer
Chief Scientist
Climate Intern
Communications Manager
Consultant
Director, Sustainability
Environment and Land Use Superintendent
Forestry Superintendent
Forestry Surpervisor
Land Use Forester
Manager Hydrology and Terrain
Operations Manager
Operations Supervisor
Planning Forester / Certification Coordinator
Planning Superintendent
Silviculture Superintendent
Stewardship Forester
Stewardship Officer
Sustainability Supervisor
Tree Improvement Forester

Q2. In which province do you work?

A2. BC 22; BC, AB, and SK 1; US and Canada 1.

Q3. In which forest region of British Columbia do you primarily work?

A3. Coast 6; North 8; South 7, All 2, US and Canada 1.

Q4. What are your primary concerns related to the impacts of climate change on the health and sustainability of SFI-certified forests in your province?

A4. Word cloud based on responses:

Q5. What are your primary concerns related to the impacts of climate change on forest operations management of SFI-certified forests in your province?

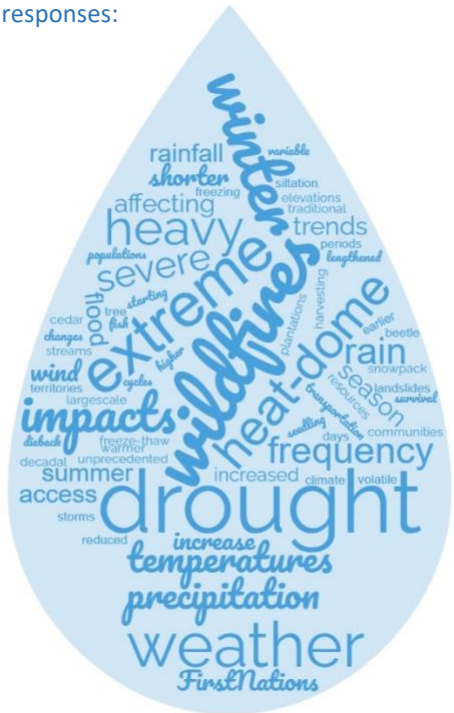
Q5. Word cloud based on responses:

Q6. Have you observed significant changes in the climate in recent years that is impacting the SFI-certified forests and their management in your province?

A6. Yes 20, No 4

Q7. If yes, what changes in climate have you observed?

Q7. Word cloud based on responses:



Q8. Have you previously conducted or contributed to a climate change risk assessment for your SFI-certified forest?

A8. Yes 8, No 16

Q9. If yes, what has been your most impactful learning from that assessment?

A9:

- "Already doing a lot of adaptive work. More to do and people on the ground need the education."
- "CVA is in progress "
- "Connect consideration of risk to what activities we carry out."
- "How little the government is doing to stay ahead of this major issue"
- "Novel climate envelopes are likely developing"
- "Preparing for an intensification of the water cycle, increased temperatures, and severe events needs to happen now"
- "Seasonal variations are much more significant than annual mean variations"
- "The increases in temperature are most prominent in winter, which is when the majority of our forest operations occur. This will result in challenges in meeting our SFM objectives."

Q10. Have you previously implemented any climate change adaptation practices on your SFI-certified forest?

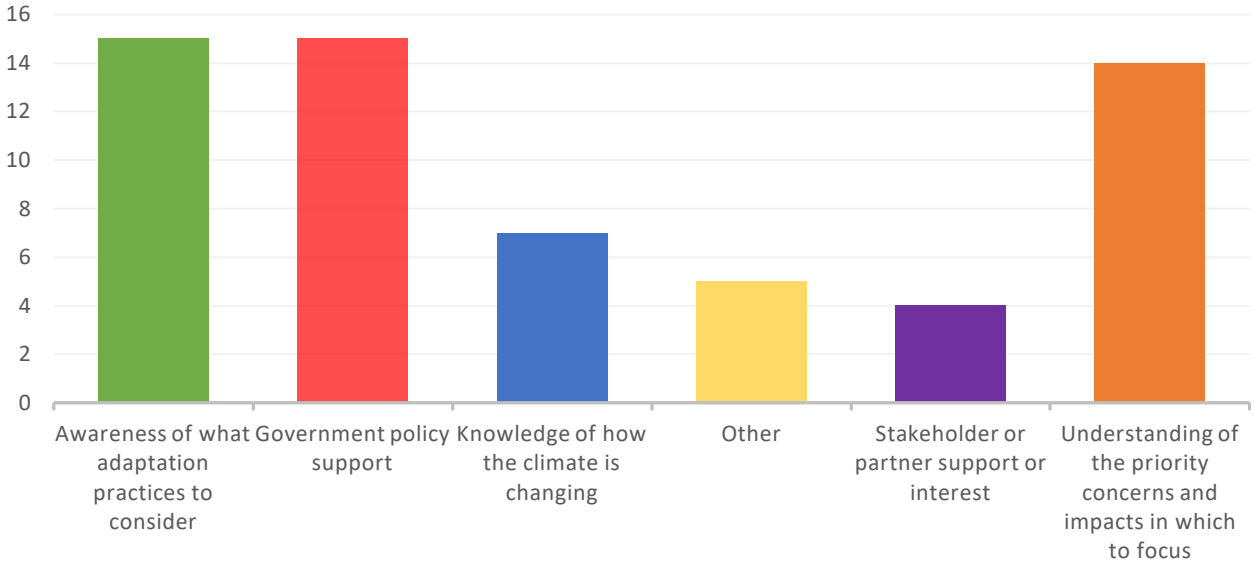
A10. Yes 17, No 7

Q11. If yes, what examples of adaptation practices have you implemented?

- "Adjusted harvest scheduling (satellite yards, spring decking); higher grade roads; adjustments to crossing structures; better water management on in-block roads (including deactivation)"
- "Alternate species selection for reforestation"
- "CBST"
- "CBST seed transfer; timing of spring planting, species selection in reforestation."
- "Climate based seed transfer, utilization of selective tree breeding to promote the use of insect and rust resistant stock, increasing infrastructure resilience through the use of larger culvert sizing, Enhanced (beyond legal requirements) operating restrictions during wildfire season, Wildland Urban Interface wildfire resilience treatments, prompt reaction and salvage planning following wind and wildfire events to limit buildup of insect pest populations, deployment of funnel traps to limit spread and increase aggregation of insect pests"
- "Climate-Based Seed Transfer"
- "culvert changes, thinning, research"
- "Focus harvesting on beetle killed timber. Mixed species planting. Retention of more deciduous trees. "
- "implemented climate based seed transfer, updated culvert sizing,"
- "Planting trees that make use of Climate Based Seed Transfer requirements"
- "Reforestation - alternate species and seed deployment, assisted migration; Changing and updating SOP's, for things such as Q100 calculations, fire weather determination, adverse weather monitoring and inspection regimes, and so forth."
- "Road rehab, diverse species planting"
- "Satellite sort yards, assisted migration trials, proactively increasing road/bridge infrastructure to withstand heavier peak flows"
- "Stocking standards, partial cutting, fire interface"
- "Tree improvement, silvicultural adjustments, crossing and stormwater infrastructure adjustments, weather station network expansion (including snowpack), watershed assessments and research"
- "Additional retention for shade, riparian, vertical structure, screening, wildlife corridors, CBST"

Q12. What barriers or challenges are a priority to address to effectively adapt your SFI-certified forest to climate change?

A12.



Other:

- "The Forestry Council is an advisory organization, not actually engaging in forest work"
- "Corporate culture"
- "Risk/Consequence of the adaptive practice not working, costing a lot more, or leading to unintended consequences. An example would be planting a warmer climate species or seedlot that fails because the climate hasn't quite changed enough!"
- "GHG accounting standards"
- "Lack of meaningful opportunities for FNs input"

Q13. Do you have any additional questions about climate change impacts or adaptation that you would like addressed at the workshop.

A13.

- "Significant opportunity for WCSIC members to share information and collaborate."
- "How to effectively and efficiently monitor and report on implementation of climate change actions."
- "How will First Nations knowledge be implemented."
- "What funding is available to support adaptation actions or mitigation strategies?"
- "Most interested in hearing what other organizations are doing to see what other strategies might be out there."
- "As a small licensee additional support from WCSIC to complete adaptation assessments, implement climate smart policies etc.

Appendix IV Additional Resources

Climate Data

- National
  - Canadian Centre for Climate Services
  - ClimateData.ca https://climatedata.ca/
  - Climate Atlas of Canada https://climateatlas.ca/

- Regional
  - Pacific Climate Impacts Consortium (PCIC)
    - https://pacificclimate.org/analysis-tools/pcic-climate-explorer
    - https://pacificclimate.org/analysis tools/plan2adapt
  - Centre for Forest Conservation Genetics UBC https://climatebc.ca/
  - FPInnovations climate vulnerability assessment tool https://storymaps.arcgis.com/stories/be140461a0874d9cb9c3e0aebe69d4cf

Climate Change Adaptation Tools, Reports and Networks

- 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
  - National Issues Report https://changingclimate.ca/national-issues/chapter/7-0/
  - CanAdapt https://can-adapt.ca/
  - Forestry Adaptation Practitioners' Network https://facop.earthnet.org/
- Regional
  - British Columbia Regional Perspectives Report https://changingclimate.ca/regional-perspectives/chapter/5-0/

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
- Regional
  - Strategic Climate Risk Assessment Framework for British Columbia https://www2.gov.bc.ca/assets/gov/environment/climate-change/adaptation/climate-risk-assessment-framework.pdf
  - Preliminary Strategic Risk Assessment for British Columbia www2.gov.bc.ca/assets/gov/environment/climate-change/adaptation/prelim-strat-climate-risk-assessment.pdf