CCF's Climate Resiliency Plan

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FRONTERA FOREST SOLUTIONS INC.

CHEAKAMUS COMMUNITY FOREST

What can we do?

Build a Climate Resilience Plan!

Climate resilience planning is a decision to be ***proactive about climate change***

- In the case of the Cheakamus Community Forest, adapting the existing sustainable forest management framework into one that addresses local climate change and its impacts.

- This provides forest managers a greater ability to ***respond*** to climate change rather than to ***react***.

What are benefits of climate resilience planning?

Greater Understanding

Gathering Knowledge/Collaboration

Adaptive Management

Climate Resilience Planning: How to Build the Plan

- **Phase 1:** Develop a local forest risk assessment (completed in spring 2025);
- **Phase 2:** Develop a Long-term Operational Strategy - what to do on the landscape (ongoing);
- **Ongoing:** Monitoring program with adaptive management (ongoing).

Project Phase 1: Risk Assessment

Key Risk	Expected Changes
Heatwaves	More frequent and intense
Wildfires	More frequent and widespread
Flash flooding	More frequent and intense
Snowpack	More variable; later onset; earlier melt; less consistent; and, decreased accumulation
Cold snaps	Less frequent
Freezing level	More variable and increased altitude
Drought	More frequent, intense, and long lasting

Climate Impacts to Forests

From: *'RMOW General Climate and Climate Change Assessment'* (2022)

Top Ranked Climatic Impacts

- #1: Increases in wildfire activity;
- #2: Forest stress and tree mortality largely due to heat & drought; and
- #3: Forest health (insects and diseases).

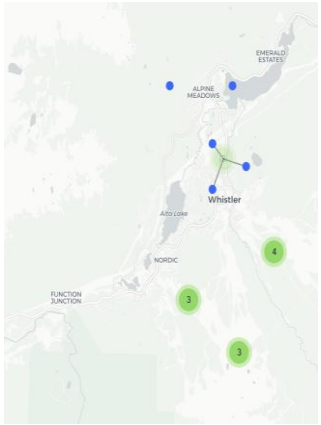
UNCERTAINTY

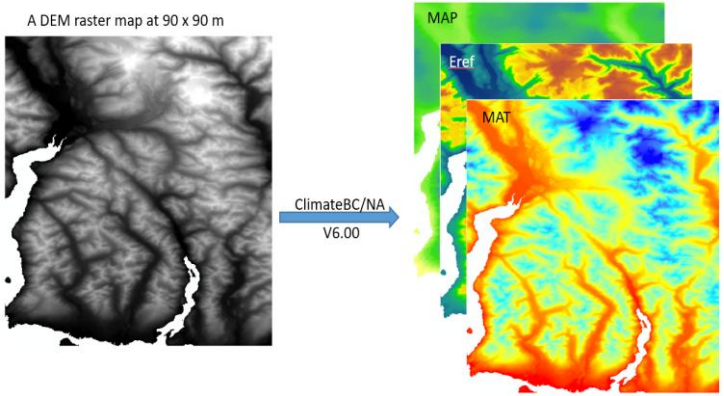
1. Predicting Wildfire Risk

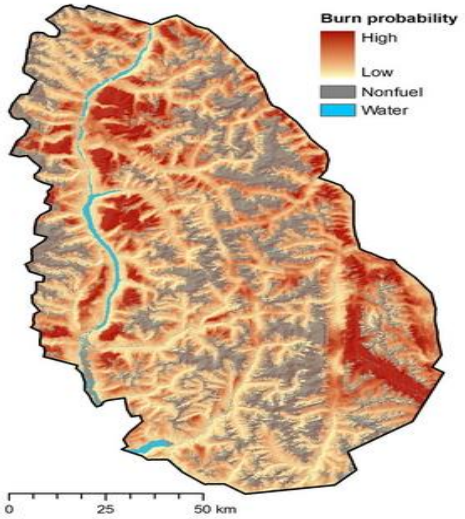
- Wildfire modelling - across landscape and at site level scale
- Collaborating with UBC Centre for Wildfire Coexistence, Dr. Lori Daniels

Simulating a Future Fire Environment

Local Weather Station Data → Regional/Local Forcing → ClimateNA Modeling → Future Fire Weather Environment → BurnP3+ Simulation



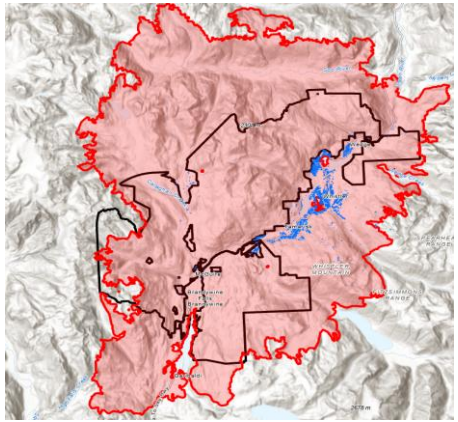




Approach to Assessing Wildfire Threat

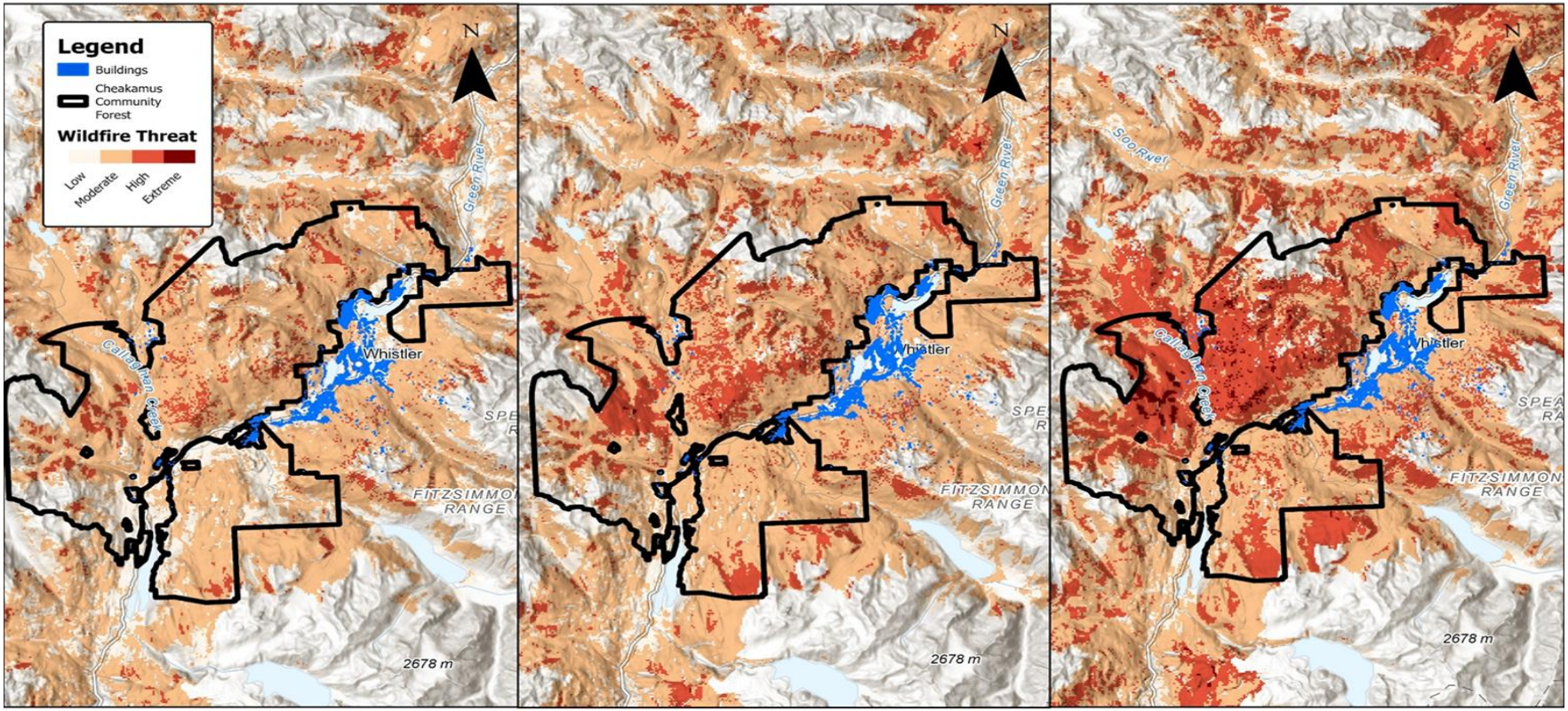
Wildfire threat integrates 3 key components that best assess a regions vulnerability to extreme fire behavior:

Wildfire Threat = (Head Fire Intensity Score*0.3) + (Rate of Spread Score*0.3) + (Probability of Burn Score*0.4)



- We leveraged the stochastic burn probability simulator BurnP3+ to assess wildfire threat currently facing the CCF and under multiple climate change scenarios:
  - Current Wildfire Threat (Observed): 1990-2020
  - Future Wildfire Threat (SSP1-2.6): 2041-2060
  - Future Wildfire Threat (SSP3-7.0): 2041-2060
- Building off that approach we also produced a Fireshed Analysis that approximates the area of concern from large wildfires for the CCF:
  - Isolates key pathways of concern
  - Simulates fire domain area or region of concern

Predicted Wildfire Threat under Different Climate Scenarios over 2041-2060 for the Cheakamus Community Forest (CCF) and Whistler Community



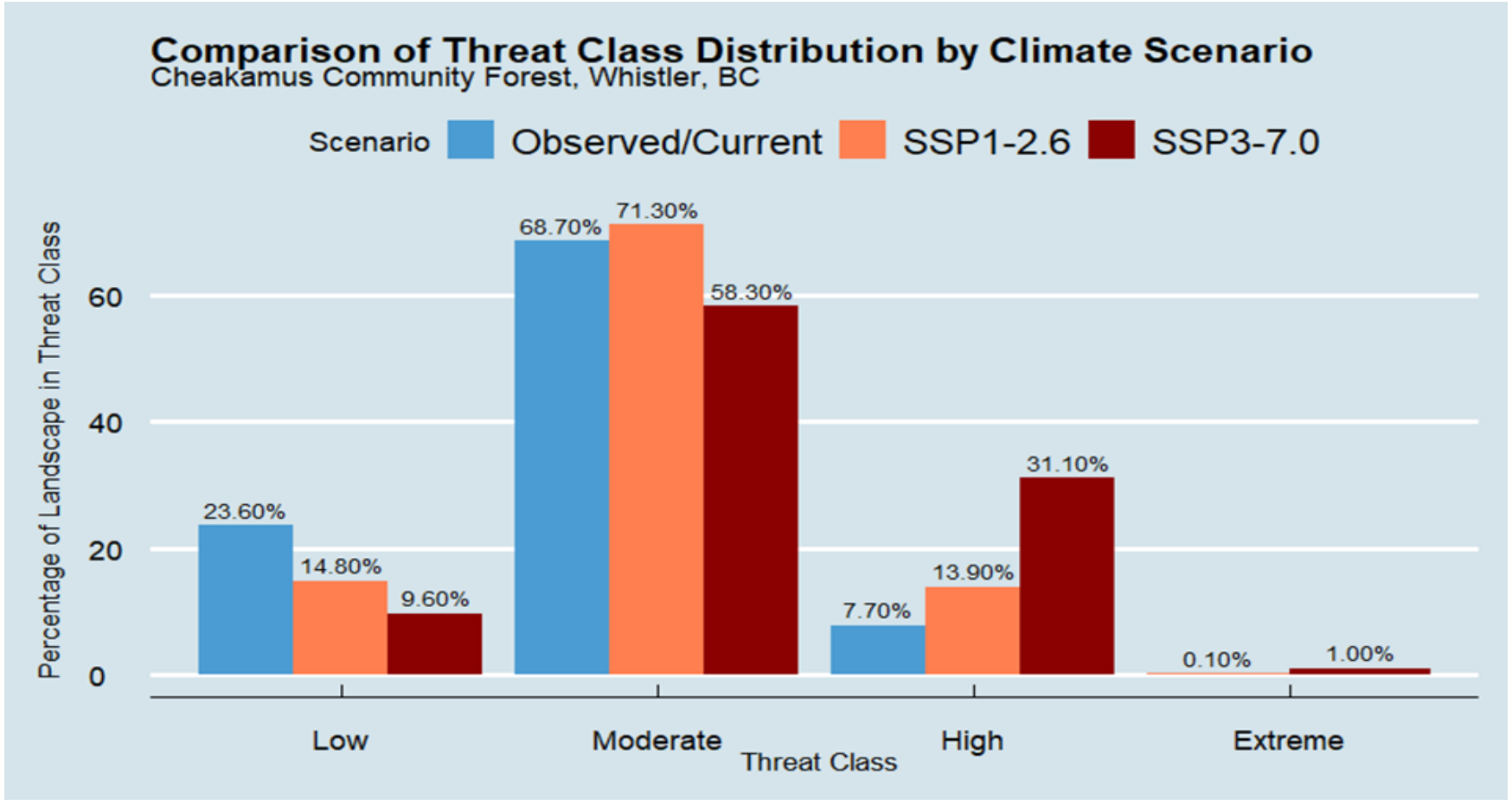
Observed/Current Climate

Modeled Climate: SSP1-2.6

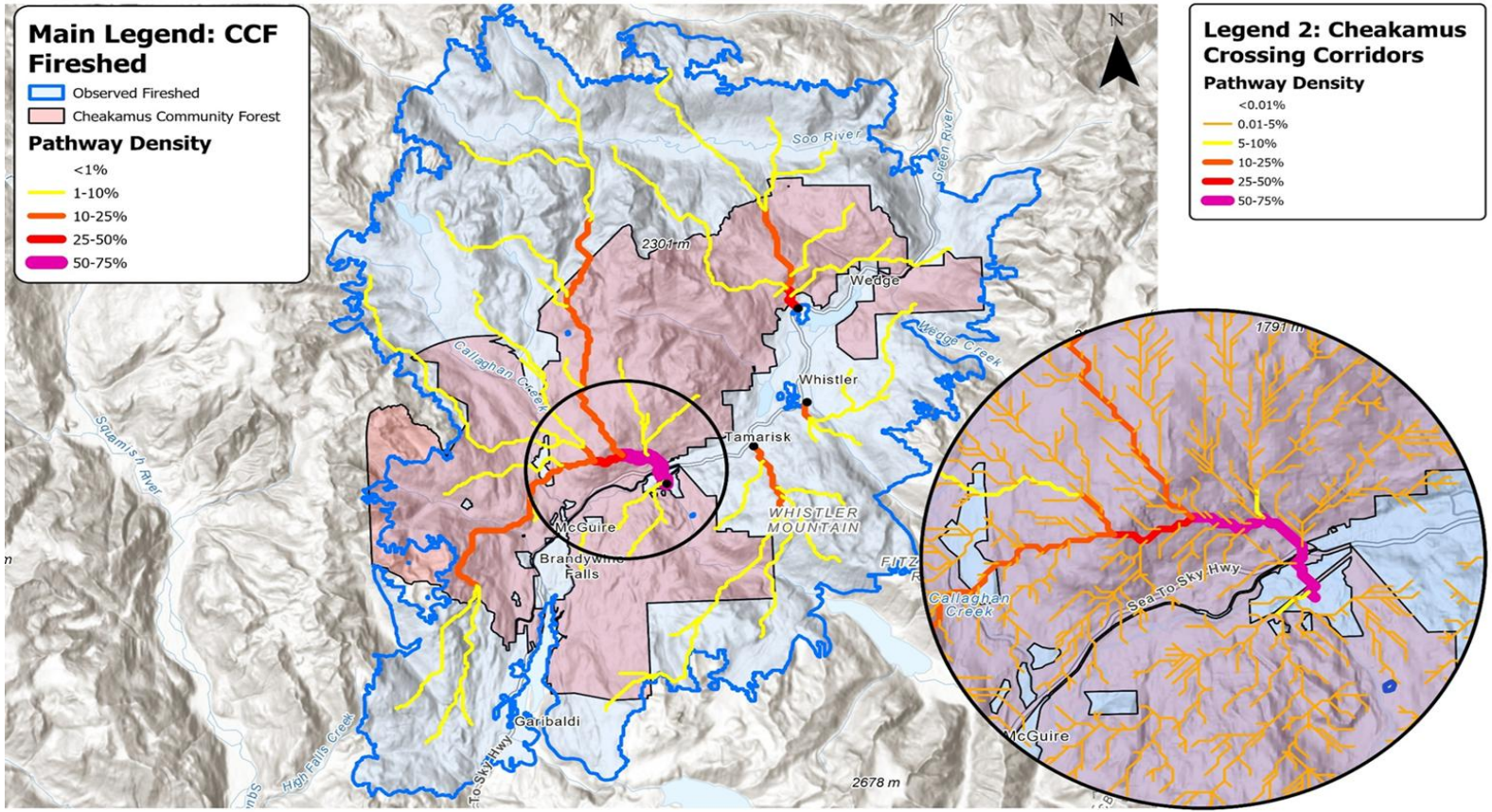
Modeled Climate: SSP3-7.0

0 2.5 5 10 Kilometers

Wildfire threat was generated from thousands of iterations or fire seasons with the Monte-Carlo based simulation model BurnP3+. Threat aggregates burn probability, extreme wildfire rate of spread and extreme fire intensity to produce standardized scores. Threat was calculated under different climate scenarios using modeled datasets to predict the change in fire environment but ignitions are static and thus threat can be compared across scenarios. Modeled scenarios are for 2041-2060.


Comparison of Threat Class Distribution by Climate Scenario
Cheakamus Community Forest, Whistler, BC
Scenario
Observed/Current
SSP1-2.6
SSP3-7.0
Percentage of Landscape in Threat Class
0
20
40
60
23.60%
14.80%
9.60%
68.70%
71.30%
58.30%
7.70%
13.90%
31.10%
0.10%
1.00%
Low
Moderate
High
Extreme
Threat Class

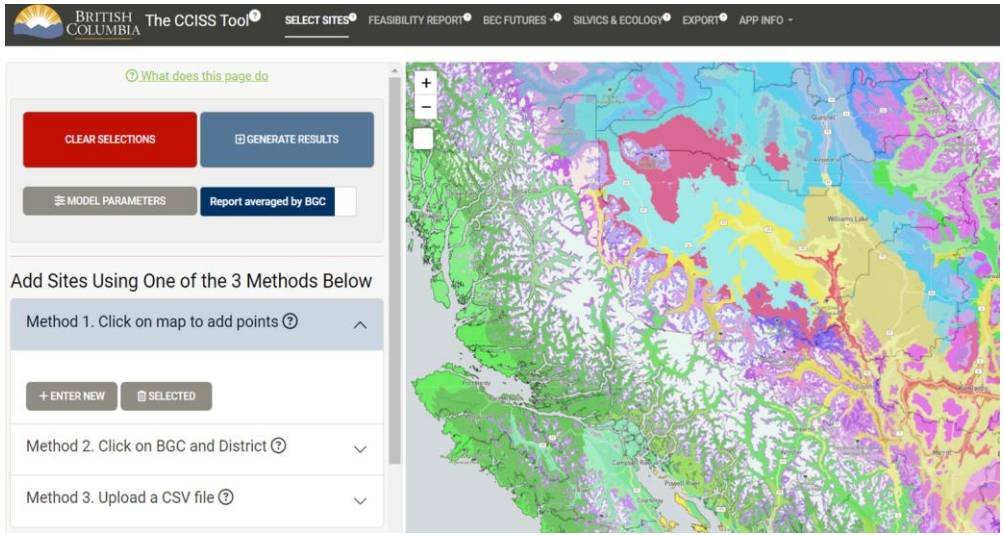
Predicted Firesheds and Fire Spread Corridors under Observed/Current Weather for the Cheakamus Community Forest (CCF) and Whistler Community



Firesheds are generated from thousands of iterations of Monte Carlo based simulation model BurnP3+ under respective weather scenarios and bound all fires which burn the CCF AOI. Fire pathways are then generated as weighted spread patterns of fires seeded in every cell within the fireshed. Pathways are generated from those cells to the closest focus points located at Cheakamus Crossing, Creekside Base, Whistler Centre, and Rainbow Neighborhood using a least cost distance algorithm based on focal statistics. Pathways are aggregated to form fire spread corridors for density analysis and represent the potential spread vectors of fires into the community.

2. Predicting Forest Stress and Tree Mortality

- Identifying regions and site conditions where forests and tree species are at highest risk to climate change stresses
- Identifying climate change refugia
- Collaboration with provincial Future Forest Ecosystems Centre using its Climate Change Informed Species Selection Tool (CCISS)



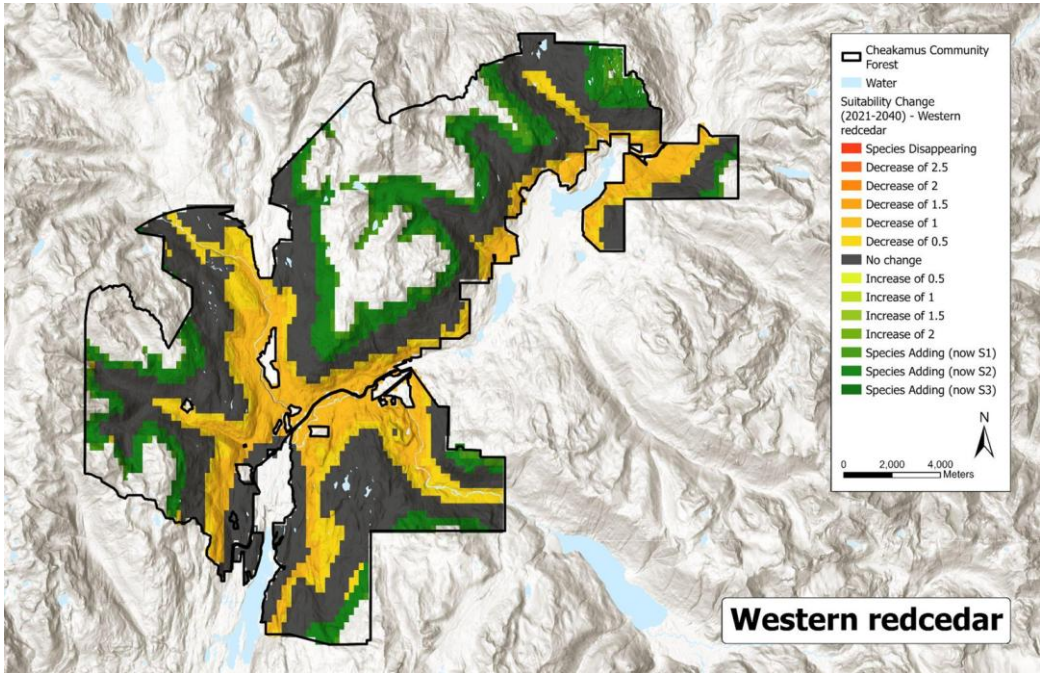
How tree coverage may adjust with climate change stresses based on CCCISS tool analysis

CCISS Suitability (2021-2040) - Western Red Cedar

General trend - many species are projected to become more suitable at higher elevation

Whistler valley is becoming too dry to support western redcedar

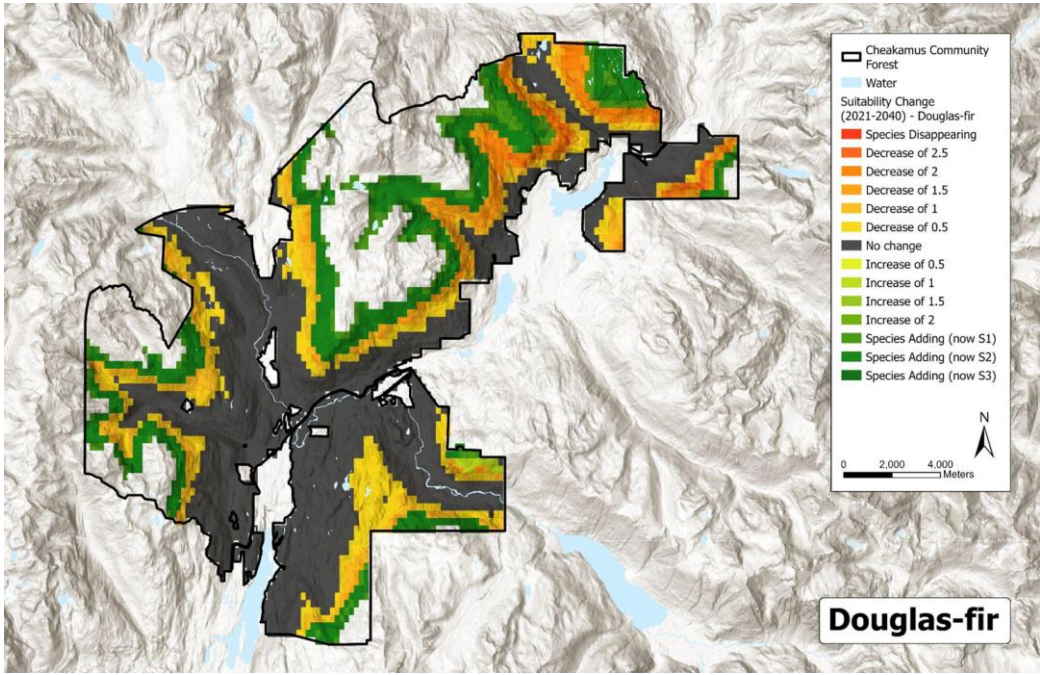
Green = increasing suitability for the tree to grow
Red = decreasing suitability
Yellow/Gray = Neutral zone



CCISS Suitability (2021-2040) - Douglas-fir

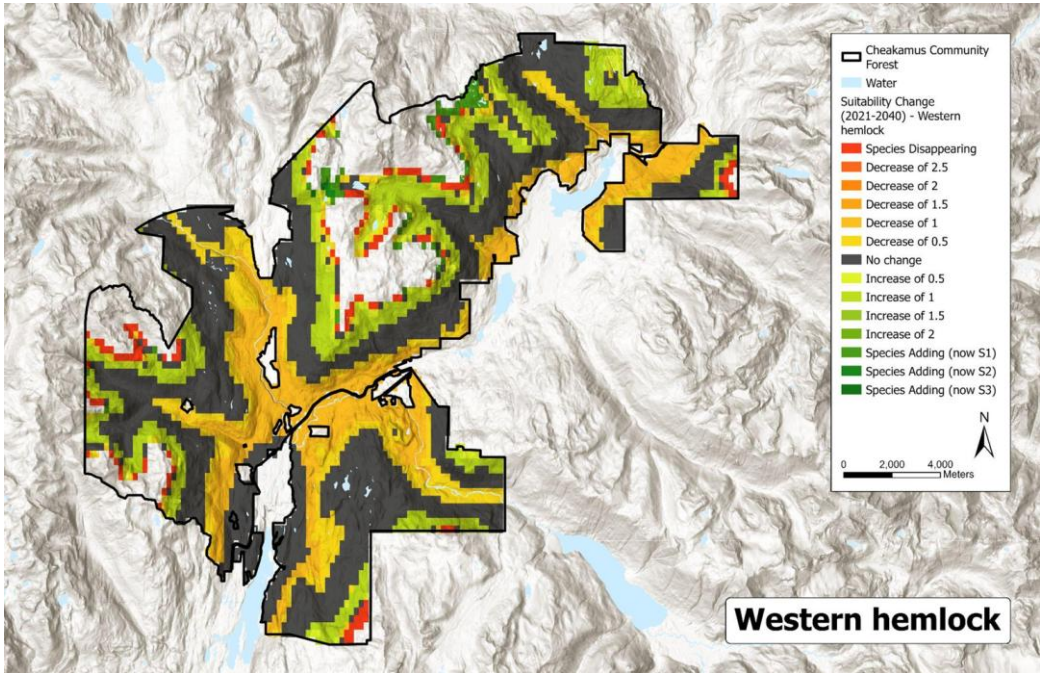
Douglas fir is more drought tolerant so the suitability is mostly unchanged along Whistler valley

The same general trend still applies - Douglas fir is also projected to have increased suitability at higher elevation



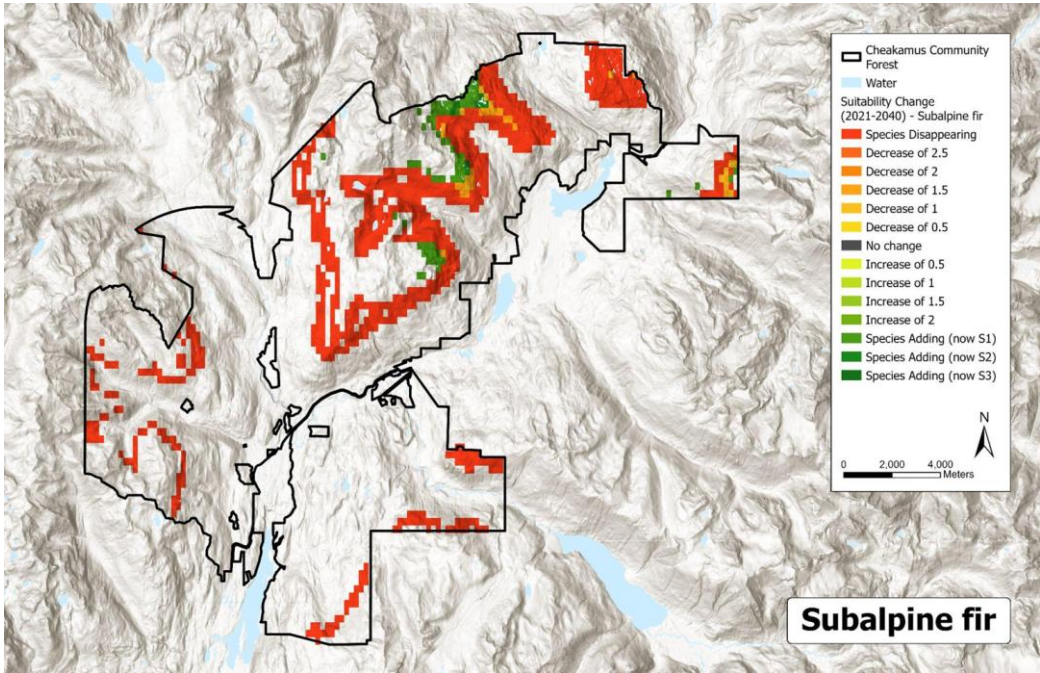
CCISS Suitability (2021-2040) - Western Hemlock

Western hemlock will become more suitable at higher elevations but less pronounced compared to Coastal redcedar and Douglas fir.



CCISS Suitability (2021-2040) - Subalpine Fir

Subalpine fir will potentially disappear from most parts of CCF



3. Predicting Forest Health Impacts

There is an assessment in the Climate Resiliency Plan that outlines the known forest health pest and pathogens in the region.

Forest health prediction is very challenging due to so many forest health agents and their interactions

A high level of uncertainty but climate change will likely increase tree stress and make them more vulnerable.

Project Phase 2: Operations Strategy

Management Option Concepts:

Resistance: Maintain relatively unchanged conditions over time.

Resilience: Allow some change in current conditions, but encourage an eventual return to original conditions.

Transition: Actively facilitate change to encourage adaptive responses to changing and new conditions.

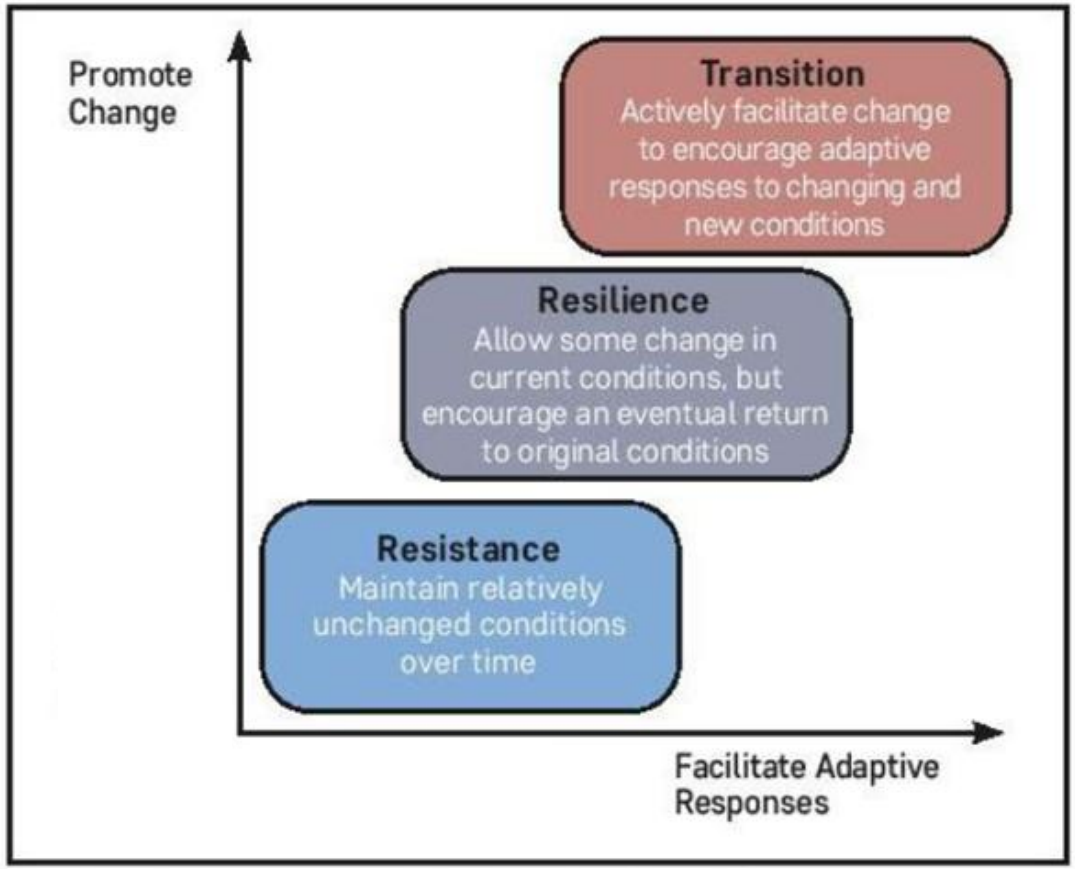


FIGURE 2. *Adaptation options, from Nagel et al 2017.*[7]

Resistance

Forests that are likely to withstand climate change

- Management would be minimal and more protection-focused.

Resilience

Middle ground of intervention - assumes these forests will be moderately or significantly impacted by climate change and would benefit from some management.

- Examples: Ladder fuel removal or tree thinning removal with innovative reforestation

Transition

These approaches anticipate future changes in the climate and facilitate the transformation of the current forest into a new forest type

Example:

- Species conversion - the process of transforming an existing forest stand into a new stand with a different species composition

Western Spruce Budworm (WSB) Cheakamus Community Forest

Extent:

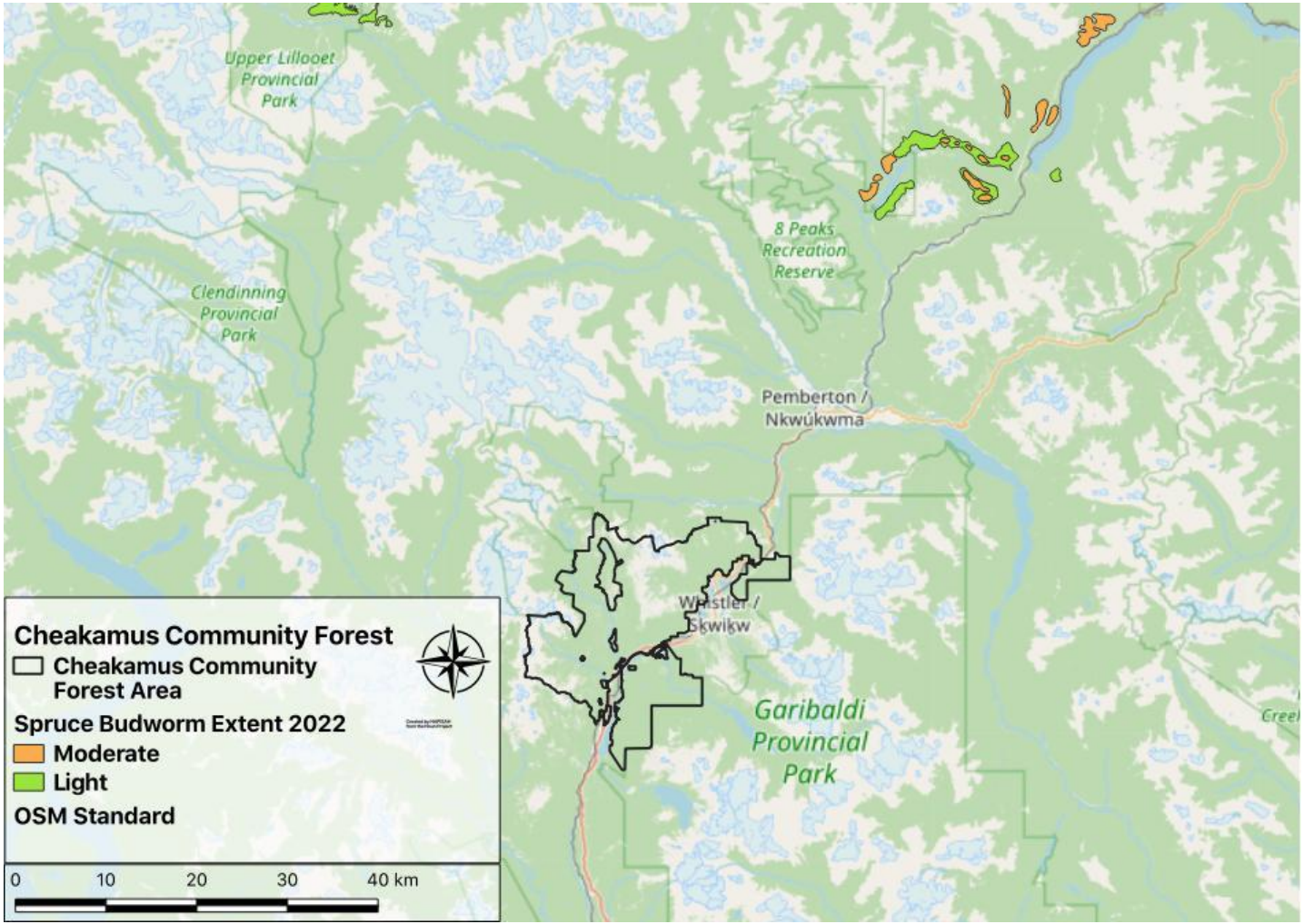
- No WSB seen south of Pemberton since 2009 and no serious outbreaks in the Whistler area since the 1970s

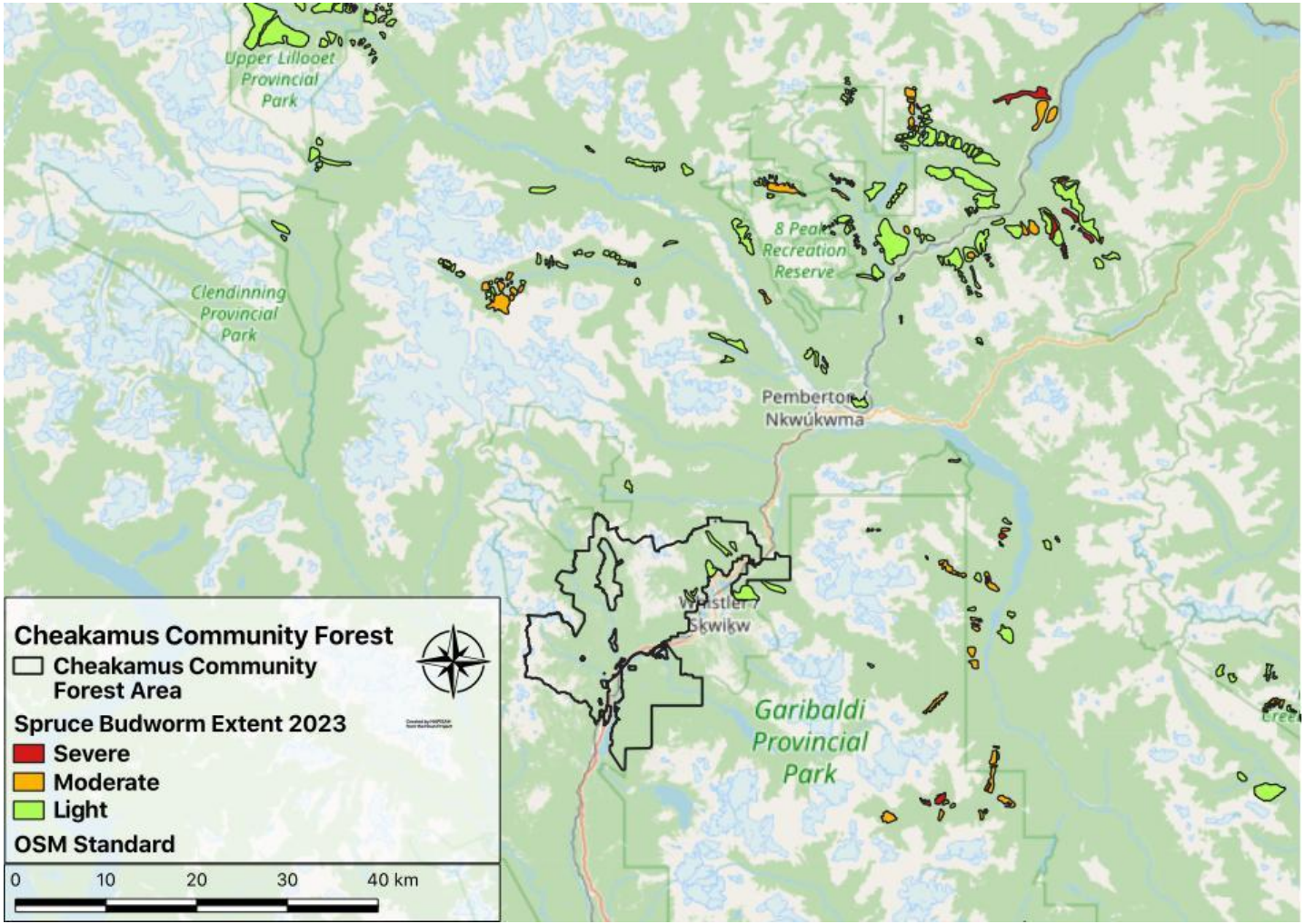
Management Options:

- Short term strategy for managing spruce budworm is primarily biological pesticide b.t.k. with high efficacy and low environmental impact to reduce number of WSB larvae
- Longer term strategies:
  - Increasing crown separation
  - Reducing stand age dynamics/ height structure
  - Increasing landscape age structure
  - Increasing species tree species diversity
  - Promoting stand health (fertilization)

Considerations:

- Western Spruce Budworm (WSB) outbreaks are known to last several years
- Climate can affect outbreak levels year on year due to synchronicity of WSB emergence with needle growth in early season.
- Autumn 2025 egg mass sampling results indicate that WSB populations are still increasing


Upper Lillooet Provincial Park
Clendinning Provincial Park
8 Peaks Recreation Reserve
Pemberton / Nkwúkwma
Whistler / Sḵwiḵw
Garibaldi Provincial Park
Cheakamus Community Forest
Cheakamus Community Forest Area
Spruce Budworm Extent 2022
Moderate
Light
OSM Standard
0
10
20
30
40 km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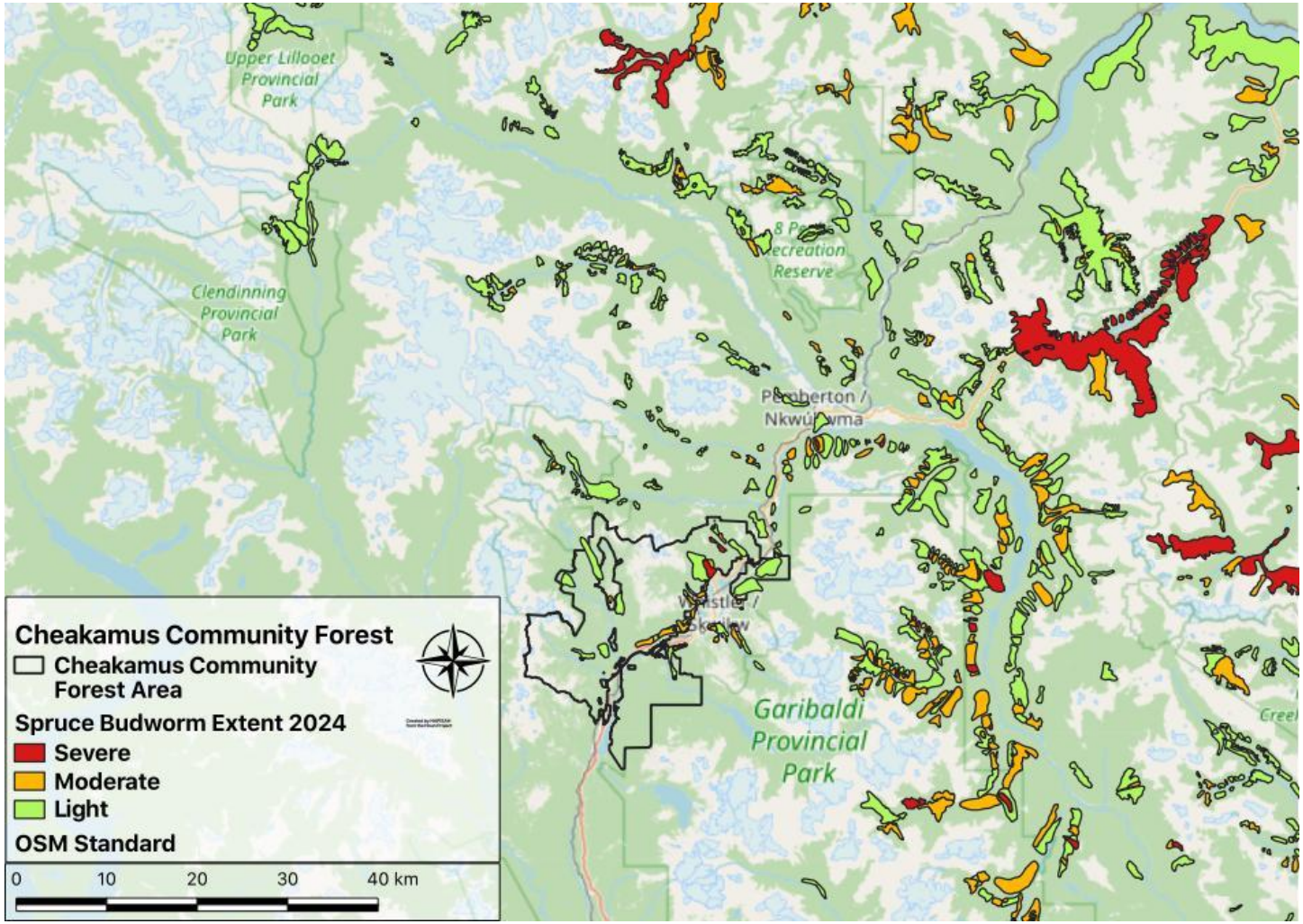
Cheakamus Community Forest Area
Spruce Budworm Extent 2023
Severe
Moderate
Light
OSM Standard
0
10
20
30
40 km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Cheakamus Community Forest
Cheakamus Community Forest Area
Spruce Budworm Extent 2024
Severe
Moderate
Light
OSM Standard
0
10
20
30
40 km

Climate Resilience Planning: Next Steps

- Develop a Phase 1 Forest Risk Assessment (Completed in March 2025)
- Develop a Phase 2 Long-term Operational Strategy (In Progress);
- Monitoring program with adaptive management built in (2026+).