Climate Change and the Newfoundland & Labrador

Winter Tourism Industry

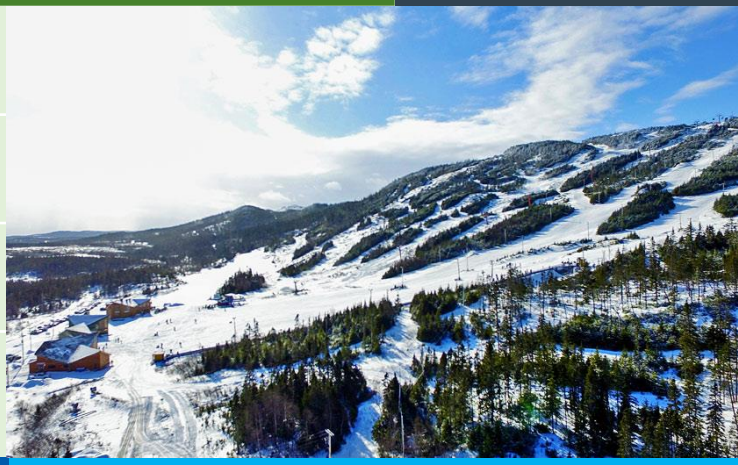
Cost Benefit Analysis of Infrastructure Adaptation

Natural Resources Canada | Ressources naturelles Canada | Canada | Newfoundland & Labrador

Funded by the Department of Environment and Climate Change

Business Profile

Name	White Hills Resort
Location	Clarenville
Operations	Downhill skiing and snowboarding, snowshoeing
Operating Season	January to April



Winter Climate Change Risks

- Onset of colder temperatures is expected to occur later in the season, impacting the start of the snowmaking season.
- Snowmaking operations are expected to shut down earlier in the year due to the earlier onset of warmer temperatures.
- Problems will be exacerbated due to existing snowmaking equipment is inefficient due to sedimentation buildup in lines.

Potential Climate Change Impacts

- Decreased operating length for winter recreation and snow sports.
- Potential loss in revenue due to fewer operating days.
- Higher maintenance costs for continued upkeep of ageing infrastructure.
- Snowmaking equipment with lower operating temperatures will be able to produce snow on a less frequent and less reliable basis.

Climate Adaptation Focus – Upgrading Snowmaking Equipment

- White Hills Resort has been experiencing a shorter operating window due to difficulty making snow at the start of the season, leading to a relatively later opening date.
- Snowmaking efforts are hampered by warmer temperatures, winter rainfall, and ageing snowmaking infrastructure. Current infrastructure generally cannot operate above -5°C and efficiency is further reduced by sedimentation issues within the pumping system that constricts pipes and snow gun outlet points.
- This problem is likely to persist throughout the coming years due to a changing winter climate, including warmer temperatures and reduced snow accumulation.

Business-as-Usual Option

- Snowmaking infrastructures is not upgraded.
- Sedimentation issues persist, meaning existing equipment cannot operate at maximum efficiency and has substantial downtime for maintenance.
- Costly maintenance is required to operate.

VS

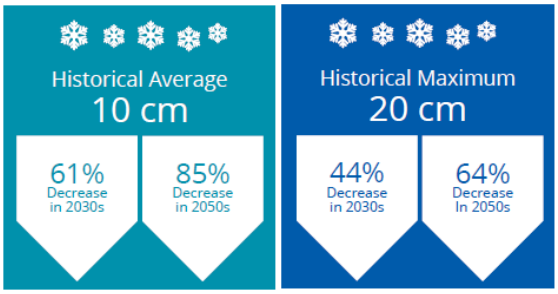
Adaptation Option

- Capital investment to replace the pumping equipment and purchase new equipment that operates in higher temperatures.
- Sedimentation problems are resolved, meaning equipment can run more frequently and efficiently.

Marble Mountain Climate Change Projections

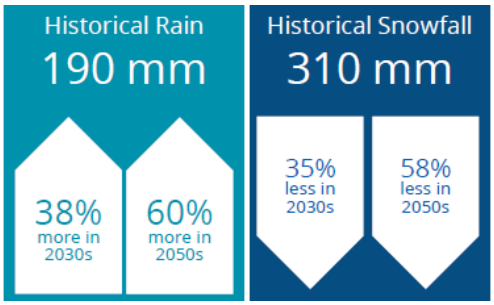
Winter Snow Depth

- Average and maximum snow depth are projected to decrease significantly over time.



Total Winter Rain and Snow

- Total winter rainfall is projected to increase, while total snowfall is projected to decrease.



Snowmaking Season

- Depending on the minimum operating temperature of snowmaking equipment, the snowmaking season will decrease by approximately 7-8 weeks by the 2050s
- The length of the snowmaking season is longer for equipment with higher minimum operating temperatures.

Start of Season			Minimum Operating Temperature	End of Season		
Historical	2030s	2050s		2050s	2030s	Historical
Nov. 23	16 days later	26 days later	-2°C	25 days early	15 days early	Apr. 19
Dec. 11	17 days later	28 days later	-5°C	30 days early	17 days early	Mar. 31
Jan. 5	18 days later	27 days later	-10°C	26 days early	16 days early	Mar. 8

Cost Benefit Analysis – Upgrading Snowmaking Infrastructure

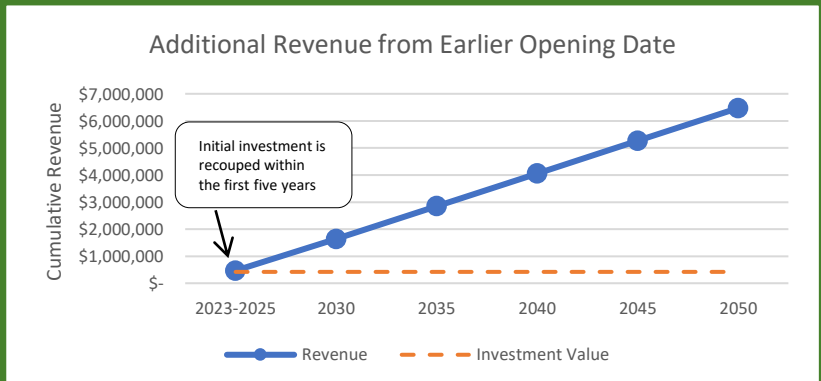
Adaptation Option

- To achieve desired opening conditions, 50% of the runs should be covered with a minimum of 6 inches of snow.
- To facilitate snowmaking, invest $450,000 to upgrade pumping equipment and water lines, and add 5 additional snow guns that operate at -2°C.
- With the new infrastructure, opening conditions can be achieved up to 32 days earlier each season compared to existing equipment*. This value can be scaled according to available investment funds and number of snow guns purchased.
- Annual revenue is increased due to additional operating days.

Business as Usual Option

- Continued snowmaking using existing, inefficient equipment. Sedimentation issues persist, meaning equipment is frequently down for maintenance and does not operate at its full capacity.
- Season becomes shorter as snowmaking equipment cannot keep up with demand.

	Existing Equipment (-5°C)	Upgraded Equipment (-2°C)	Potential Additional Operating Days
Days to Achieve Opening Conditions	35	23	
Potential Opening Date (baseline)	January 15th	December 15th	31
Potential Opening Date (2030s)	February 1st	December 31st	32
Potential Opening Date (2050s)	February 12th	January 10th	33



*Analysis does not account for potential snow loss due to winter rainfall events