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	Marble Mountain
Location	Steady Brook
Operations	Downhill Skiing and Snowboarding
Operating Season	December - April

Winter Climate Change Risks

- Onset of colder temperatures is expected to occur later in the season, impacting the start of the snowmaking season.
- Snow accumulation is projected to reduce as average temperature increase, meaning operations will become increasingly reliant on snowmaking.
- Existing snowmaking equipment is ageing and has a low minimum operating temperature relative to new technology.

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

- In recent years, Marble Mountain 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. This problem has been exacerbated by ageing snowmaking infrastructure that generally cannot operate above -5°C.
- This problem is likely to persist throughout the coming years due to a changing winter climate, including warmer temperatures and less natural snowfall.
- The cost benefit analysis will investigate the financial pros and cons of investing in new snowmaking infrastructure to help extend the season.

Business-as-Usual Option

- Snowmaking infrastructure is not upgraded.
- Opening date continues to get later and later as average temperatures increase, reducing overall revenue.
- Costly repair and maintenance will be required to operate ageing infrastructure.

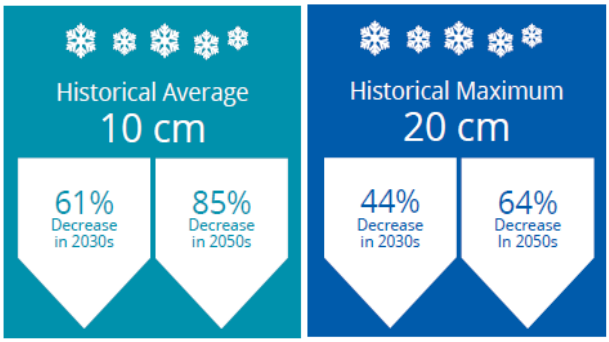
VS

Adaptation Option

- Investment into new snowmaking equipment that can operate in warmer temperatures, approximately -2°C.
- More snow can be made earlier in the season, meaning Marble Mountain can achieve earlier opening dates.

Marble Mountain Climate Change Projections

Winter Snow Depth



Snowmaking Season

- Average and maximum snow depth are projected to decrease significantly over time, meaning Marble Mountain will rely more and more on snowmaking.
- 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 will be 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 Equipment

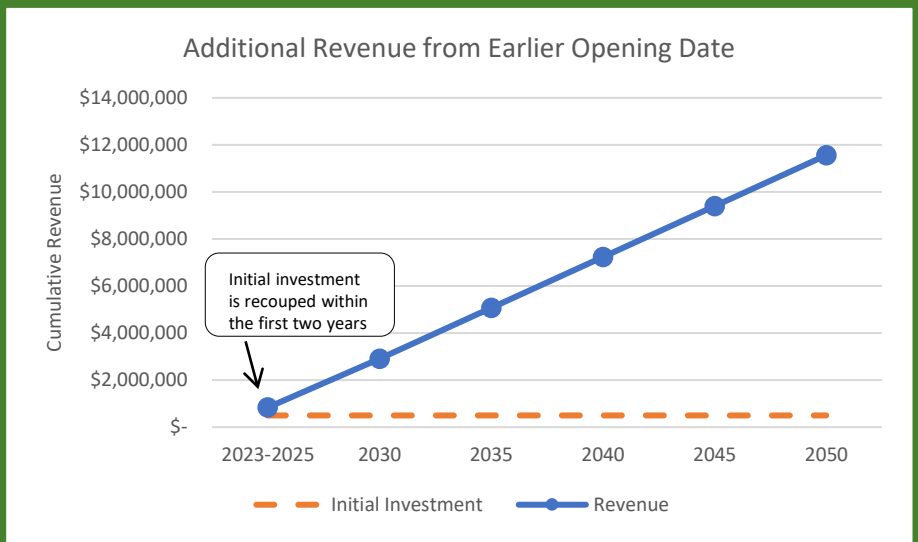
Adaptation Option

- To achieve opening conditions, 25% of the runs should be covered with a minimum of 6 inches of snow.
- To facilitate snowmaking, invest approximately $500,000 to purchase 10 new snowmaking guns that can operate at -2°C.
- With the new equipment, opening conditions can be achieved up to 32 days earlier each season compared to existing equipment*. This value can be scaled according to the available investment funds and number of snow guns purchased.
- Annual revenue is increased due to additional operating days at the beginning of the season.

Business as Usual Option

- Without upgrading equipment, the operating season becomes shorter and shorter as temperatures increase, less snow accumulates, and snowmaking equipment cannot keep up with demand.
- Operational expenses remain high due to costly maintenance and electricity costs associated with existing equipment.

	Existing Equipment (-5°C)	Upgraded Equipment (-2°C)	Potential Additional Operating Days
Days to Achieve Opening Conditions	21	16.5	
Potential Opening Date (baseline)	January 1st	December 9th	23
Potential Opening Date (2030s)	January 18th	December 25th	24
Potential Opening Date (2050s)	January 29th	January 4th	25



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