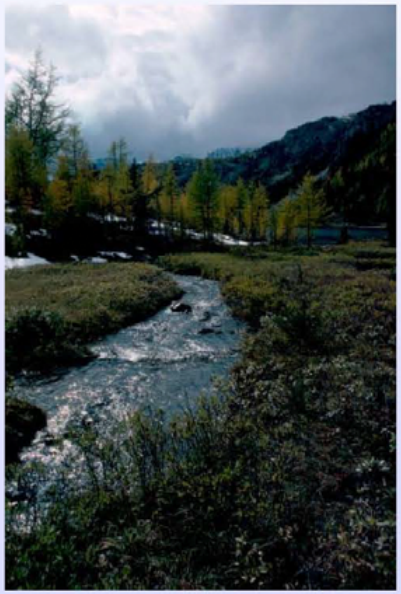
POTENTIAL IMPACTS OF CLIMATE CHANGE ON PARKS AND PROTECTED AREAS

Global climate change is an important consideration for the conservation of ecological integrity in parks and protected areas. Some of the key concerns with climate change related specifically to these areas are outlined in the poster below, which was created by the Ministry of Environment.

Glaciers, Snowpack and the Hydrological Cycle

Retreating glaciers are one of the most immediately evident impacts of warmer temperatures in the Northern Hemisphere, and studies demonstrate that many glaciers in B.C. are shrinking. Ongoing warming will very likely result in continued and possibly more rapid retreat of lower elevation glaciers. Effects on high-elevation glaciers such as those in Mount Assiniboine Provincial Park will likely be less immediate because at high elevations snow continues to accumulate on glaciers during winter and spring. Glacier melting may increase risk of erosion of fragile landforms, fossil beds and Karst sites within the Park. Glaciers currently represent 10% (3875 ha) of the Park landscape.

Climate change also affects snowpack. Increased precipitation in winter may mean that in some areas – particularly at higher elevations – snowpack depth and density increase. The total area of snowpack will likely shrink, however, as warmer temperatures in winter and spring mean a greater proportion of total precipitation will fall as rain rather than snow, especially at low and mid elevations. In addition, earlier spring thaws will likely reduce snowpack duration.

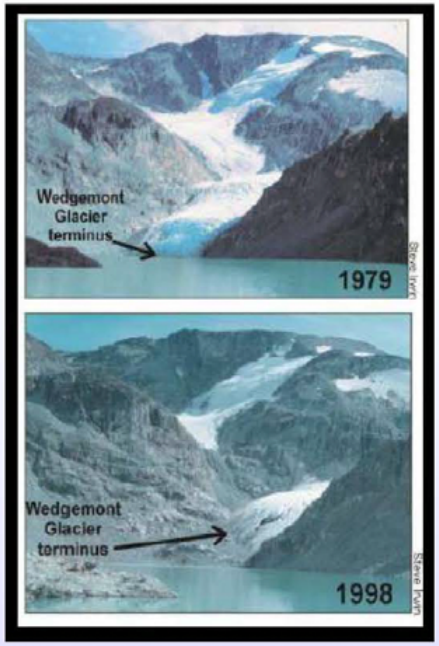


Changes in climate, glaciers, and snowpack will likely affect many streams and rivers within the Park. More rain and less snow in winter means that precipitation runs directly into streams and rivers, increasing winter flows and the potential for flooding. Warmer spring temperatures mean that snow and ice melt earlier in the year and that peak flows therefore occur earlier. In contrast, there is typically less water available from late spring to early fall. In summer, decreased precipitation in combination with reduced stream flows may contribute to drought, reduced groundwater supply, and reduced water quality. In the short term, glacier melting may temporarily augment summer flows; over the long term glacier disappearance may reduce flows.

Such changes may affect Park users. Increased annual precipitation may increase the frequency of landslides, debris flows, and avalanches, thereby increasing risks for backcountry users of the Park. Some lower elevation recreational areas may become less accessible in winter as a result of reductions in the size and duration of snowpack. Access to water may be reduced in areas of the Park – including some campgrounds and trails – that depend on summer snowmelt for water supply.

Changes in precipitation and hydrology will likely affect species and ecosystems. Increasing snowpack at higher elevations may restrict movement of wildlife that overwinter at such elevations. Reduced summer moisture may contribute to loss of some wetlands, and slower vegetation growth. Reduced stream flows in late summer and early fall may endanger some aquatic species, including those at risk.

Glacier Retreat



In what ways could Park management decrease the risks to Park users from changes in hydrology?

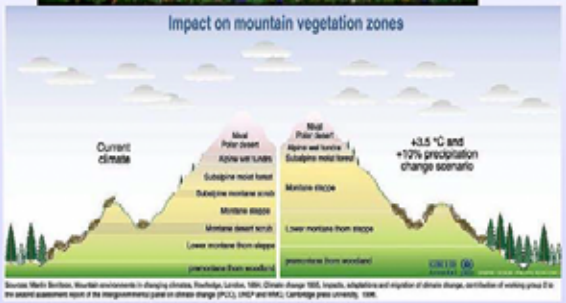
* This information is provided for the convenience of the reader but is not part of our audit report.

Ecosystem Shifts: A Threat to Alpine Meadows

Numerous studies have concluded that changes in climate affect vegetation both directly and indirectly (for example by changing soil moisture and other factors important to plants). Climate change is therefore expected to affect ecosystems within the Park. Of primary concern is the potential impact on alpine meadows. Such ecosystems represent only 2% (776 ha) of total Park area and their protection and enjoyment are important management objectives.

Climate change may affect alpine meadows in several ways. It will lengthen the season for warm-weather outdoor recreation, increasing overall visits to the alpine and the potential for damage to this fragile ecosystem. It may also result in an ecological "squeeze" that reduces the overall size of the alpine.

As the climate changes, plants and animals will be able to move into new geographical areas. Such migration will typically be to higher latitudes – and in B.C. this means northwards. In the Park and other mountainous areas, migration will also be upwards. One scenario of shifts in provincial vegetation-soil-climate (BEC) zones over the next century suggests that of the area of the Park that is currently classified as the Alpine Tundra zone, 60% by 2085 may become climatically more suited to the trees and other plants of the Engelmann Spruce-Subalpine Fir zone. Unfortunately, as the vegetation of the ESSF moves upwards there will be less space available for the plants of the alpine zone. The potential consequences include loss of alpine species – in particular those that are moisture sensitive or otherwise at risk – and significant changes in the alpine scenery that brings so many visitors to the Park.



In light of the additional risk from climate change, should Park managers limit access to the fragile alpine meadow areas?

* This information is provided for the convenience of the reader but is not part of our audit report.

Natural Disturbance Patterns: Wildfire and Insects

Wildfires, insect outbreaks, and other disturbances interact with ecosystems over time to create a mosaic of different vegetation types and forest age classes. Changes in climate may affect natural disturbance patterns in the Park.

Historic fire suppression is linked in some forests to fuel buildup and a greater fire risk. Longer, drier, and warmer summers associated with climate change will likely contribute to more frequent and more intense fires, as well as a longer fire season. In the Park, this may decrease visitor safety, increase risks to heritage buildings including Assiniboine Lodge and Naiset Cabins, impair access to some recreational areas, and add management or emergency costs.

Warmer winters and a longer growing season may contribute to the severity of pest outbreaks. A notable example, and one that is present in the Park, is the mountain pine beetle. The species over-winters in its larval stage. In the early stage, larvae are vulnerable to cold winter temperatures, while in the late stage larvae can withstand temperatures close to minus 40 degrees C. With a longer growing season, more larvae reach the late larval stage before winter sets in, and with fewer cold winters, more survive through to the following year. Trees killed by the beetle are more susceptible to fire.

Sites disturbed by fire and insects are more vulnerable to invasive, weedy species, which may thrive under a climate change regime.

Is prescribed burning an effective way to prepare for the impacts of climate change on the Park?

* This information is provided for the convenience of the reader but is not part of our audit report.