Parks Canada Parcs Canada

Canada

Yoho National Park

Climate Summary

Elev. Range: 1,030 to 3,525 m
Area: 1,313 km²
Latitude: 51.4 °N
Longitude: 116.5 °W

About Yoho National Park

Yoho National Park is located in southeast British Columbia and protects 1,313 km² of the western slopes of the Main Ranges of the Rocky Mountains Natural Region. The lands, ice, and waters are part of the traditionally used territory of the Ktunaxa and Secwépemc peoples and are places of ecological, cultural, and historical significance. Yoho is renowned for its striking mountain landscape characterized by steep mountain peaks, cliffs, numerous alpine glaciers and icefields, the Kicking Horse Canadian Heritage River, turquoise lakes, waterfalls, and world-renowned Burgess Shale fossil sites. The park's montane, subalpine, and alpine ecosystems hold significant ecological importance and support populations of iconic wildlife species such as grizzly bear, mountain goat, wolf, wolverine, elk, bull trout, westslope cutthroat trout, and the endangered whitebark pine.

Changes in Temperature

Yoho National Park, much like the rest of Canada, is warming faster than the global average. If emissions continue to increase at the current rate, then by 2051-2080 the average annual temperature in the park is projected to increase by about 3 to 4 degrees relative to the recent past. The effects of a warming climate include hotter maximum temperatures, warmer minimum temperatures, fewer days below zero per year, and longer frost free seasons. A warmer climate will influence both terrestrial and aquatic ecosystems within Yoho. For example, warmer air temperatures will increase waterbody temperatures, threatening cold-adapted species like westslope cutthroat trout, and will also likely intensify some weather extremes, increasing the severity of heatwaves, droughts, and wildfires.

Changes in Precipitation and Water Availability

Within Yoho, total annual precipitation is projected to increase by 2051-2080. However, climate models suggest there is the potential for a decrease in precipitation during the summer months. Models also project an increase in precipitation extremes (e.g. heavy precipitation events) over that same time period. For example, the maximum amount of rainfall over a 1-day period is expected to increase by about 21% under a high-emission scenario, relative to the recent past. Seasonal changes in temperature and precipitation (see the *Climograph*, p.2) will likely combine to affect glaciers, snowpacks, stream flows, and wetland and lake levels. For example, warmer spring and fall temperatures may lead to longer snow-free periods during the year. Furthermore, permafrost thaw and the loss of glacier and snow cover, in combination with more extreme rainfall events, will likely result in increased erosion, rock fall, debris flows, and glacial meltwater outburst floods (such as the Cathedral jokulhlaup) in some areas.

Variable	Recent Past[1] 1961 to 1990	Moderate Emission Future[2] 2051-2080	High Emission Future[2] 2051-2080
Average annual temperature	-1.4 °C (-1.6 to -1.2)	1.6 °C (1.1 to 3.2)	2.9 °C (2.0 to 4.8)
Hottest day of the year	24.6 °C (23.7 to 25.0)	28.4 °C (27.2 to 30.8)	30.5 °C (28.6 to 33.4)
Frost free season (days)[3]	46 (42 to 53)	104 (89 to 129)	124 (102 to 146)
Days per year below zero	142 (140 to 144)	113 (92 to 119)	104 (73 to 111)
Growing degree days (5°c)[4]	484 (449 to 507)	927 (804 to 1227)	1149 (970 to 1537)
Total annual precipitation	879 mm (857 to 896)	960 mm (887 to 999)	992 mm (896 to 1031)
Wet days (> 10 mm)	19 (18 to 20)	23 (20 to 26)	25 (21 to 27)
Maximum 1-day precipitation	25 mm (24 to 27)	29 mm (27 to 31)	30 mm (28 to 34)

Projected climate values for Yoho National Park.

Larger values denote the median of an ensemble of 26 climate models; values in brackets denote the 10th and 90th percentile values. Values have been spatially averaged across the park and temporally averaged over two 30-year time periods (1961-1990 and 2051-2080).

[1] The recent past was computed using historical model simulations.

[2] The 'moderate emission future' refers to SSP2-4.5 and 'high emission future' refers to SSP5-8.5. SSP1-2.6 is another scenario that describes warming under much lower emissions.

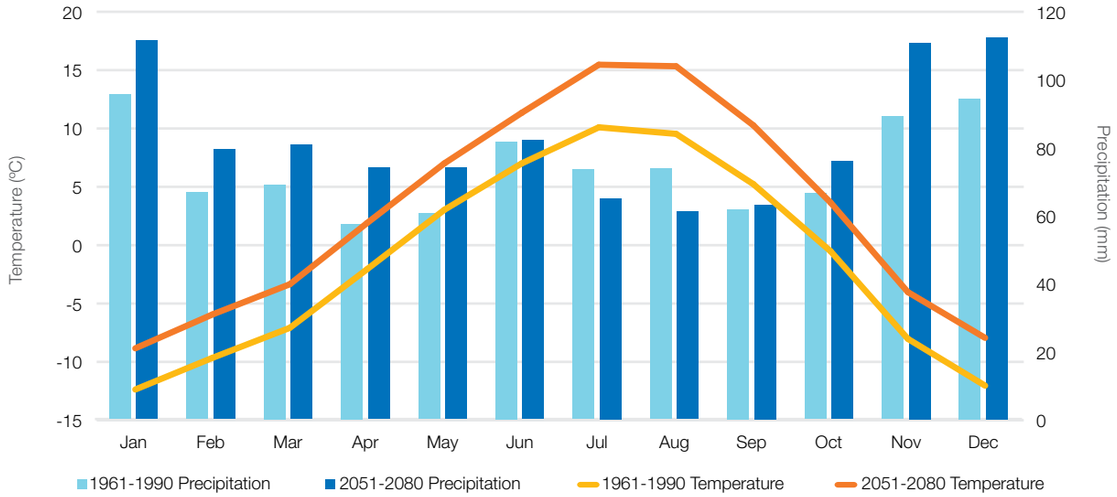
[3] The number of days between the last spring frost (last day with a mean temperature below 0 °C) and the first fall frost (first day with a mean temperature below 0 °C).

[4] Growing degree days (GDD) provide an index of the amount of heat available for the growth of plants and insects. GDDs accumulate whenever the daily mean temperature is above 5 °C.

Wapta Icefield
Photo: © Parks Canada / Todd Keith.
All rights reserved.

Spotlight on Impacts: Glaciers and Icefields

The Wapta Icefield and the numerous alpine glaciers throughout Yoho are key features of the park's landscape and provide critical water for aquatic ecosystems and downstream communities. Additionally, glaciers and icefields enable a variety of recreational activities, such as ski touring, mountaineering, and sightseeing. In recent decades, glaciers throughout western Canada have been rapidly receding due to changing climate conditions. This loss of glacial volume and surface area is expected to continue, with projections indicating these glaciers will lose between 60 to 100% of their mass by the end of the century. The Yoho region is expected to be among the most significantly impacted areas and could experience total deglaciation by 2100.



Climograph showing projected monthly temperature and precipitation values for the past (1961-1990) and future high emission scenario (SSP5-8.5; 2051-2080). Values represent the mean of a 26 climate model ensemble averaged across Yoho National Park. Note: This graph only shows the mean value of the ensemble and does not display the range of individual model projections.

Looking Toward the Future

The amount of warming we experience in the future depends on the concentration of greenhouse gases in the atmosphere. To account for future emissions uncertainty, climate models are run using different scenarios, called Shared Socioeconomic Pathways (SSPs). SSP1-2.6 is a low emission scenario characterized by rapid emissions reductions and policy focused on sustainable development. In this scenario, emissions peak around 2020 and decline to zero near mid-century. In the moderate SSP2-4.5 scenario, socioeconomic development continues to follow current patterns and emissions peak around 2050 then decline. SSP5-8.5 represents a very high emission scenario characterized by further fossil-fuel driven economic development. In this scenario, emissions rise throughout the century.

About the Data

As per standard practice, the data in this report comes from an ensemble of 26 CMIP6 global climate models that have been downscaled to 6 km by 10 km using the BCCAQv2 method. Values have been spatially averaged across the park and temporally averaged over two 30-year time periods (1961-1990 and 2051-2080). The summary table on the reverse page displays the median, 10th and 90th percentile values of the climate model ensemble, which helps demonstrate the range in model projections. For a full description of the data and modeling methodology, and to download additional data, visit ClimateData.ca.

Potential Climate Change Impacts and Adaptation Responses

Climate change will affect all programs under Parks Canada's mandate. There are many likely impacts associated with projected future climate conditions at Yoho National Park. The table below outlines some examples of these projected conditions and impacts, as well as potential options for adaptation responses. Parks Canada works with Indigenous partners to develop and implement climate change adaptation responses. Parks Canada uses information like this, along with Indigenous knowledge, to better manage operations in national historic sites, national parks, and national marine conservation areas, and the services offered to visitors.

Parks Canada Program Area	Future Climate Condition	Example of Likely Impact	Example of Potential Adaptation Response
Natural Heritage	Warmer temperatures	Increased stream and lake water temperatures	Maintain and restore key aquatic habitats that support native cold-water fish (bull trout and westslope cutthroat trout) and are likely to persist as other areas warm.
Cultural Heritage	Warmer temperatures	Increased erosion as permafrost thaws	Work with stakeholders to identify alternative locations and designs for heritage structures lost to erosion (e.g. Abbot Pass Hut).
Visitor Experience	Warmer temperatures	Changes in glacier and snow conditions	Assess and develop options for alternative emerging winter recreation opportunities in response to changing conditions.
Health, Safety & Wellness	Increased intensity and frequency of extreme precipitation events	Increased avalanche risk	Educate back-country visitors and employees on changing conditions and increased avalanche risk.
Built Assets	Warmer temperatures	Increasing landslide activity due to permafrost thaw/ glacial melt	Review mitigation plans and infrastructure design to adequately protect the Trans-Canada Highway and railroad from changing debris flow frequency and magnitude.

Working Together

The Canadian Centre for Climate Services (CCCS) provides access to data and information as well as offers training and support on how to use climate information to support decisions that increase resilience to the impacts of climate change. Parks Canada works with CCCS to develop site-specific climate change summaries that inform and support adaptation planning at Parks Canada-administered places.

Canada.ca/climate-services | changementclimatique-climatechange@pc.gc.ca