THAIDENE NENE NATIONAL PARK RESERVE

CLIMATE SUMMARY

VARIABLE	RECENT PAST[1] 1961-1990	MODERATE EMISSION FUTURE[2] 2051-2080	HIGH EMISSION FUTURE[2] 2051-2080
AVERAGE ANNUAL TEMPERATURE	-7.6 °C (-7.8 to -7.4)	-3.9 °C (-4.7 to -2.4)	-1.9 °C (-3.7 to -0.5)
DAYS ABOVE 25 °C	3 (3 to 4)	11 (7 to 17)	18 (9 to 27)
FROST-FREE SEASON (DAYS)[3]	95 (92 to 98)	119 (110 to 132)	131 (119 to 142)
DAYS WITH T_{MAX} BELOW 0 °C	195 (194 to 197)	178 (172 to 182)	168 (163 to 178)
DAYS WITH T_{MIN} BELOW -25 °C	98 (97 to 101)	68 (57 to 74)	52 (36 to 62)
TOTAL ANNUAL PRECIPITATION	275 mm (268 to 282)	325 mm (301 to 339)	340 mm (317 to 351)
MAX 5-DAY PRECIPITATION	27 mm (26 to 29)	32 mm (28 to 36)	33 mm (30 to 37)
SPEI DROUGH INDEX (3 MONTH)[5]	-0.09 (-0.17 to 0.11)	-0.27 (-0.59 to 0.21)	-0.48 (-1.15 to 0.34)

Projected climate values for Thaidene Nene National Park Reserve. *Larger values denote the median of an ensemble of 24 climate models; values in brackets denote the 10th and 90th percentile values.*

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

[2] The 'moderate emission future' refers to RCP4.5 and 'high emission future' refers to RCP8.5. RCP2.6 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] The 3-month Standardized Precipitation Evapotranspiration Index (SPEI) is a drought index based on the difference between precipitation and potential evapotranspiration over three months (June - August). Negative values indicate water deficit.

About Thaidene Nene National Park Reserve

Thaidene Nene National Park Reserve is located in the East Arm of Great Slave Lake, Northwest Territories. The lands and waters are located within the heart of Łutsël K'é Dene First Nation's homeland. The Northwest Territory Métis Nation, Deninu Kųę First Nation, and Yellowknives Dene First Nation also have traditional and cultural ties to the area. The Mǫwhì Gogha Dè Nııtłèè, the Tłı̨chǫ traditional area, overlaps the park boundary and the North Slave Metis Alliance also asserts traditional territory in the national park reserve. The park protects boreal forest, freshwater, and tundra ecosystems characteristic of the Northwestern Boreal Uplands Natural Region. The area exemplifies the transition from the Taiga Shield Ecoregion to the Southern Arctic Ecoregion. Approximately 42 mammal and 171 bird species inhabit this outstanding example of intact, remote northern wilderness.

Changes in Temperature

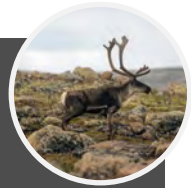
Thaidene Nene National Park Reserve is located in northern Canada, which is warming up to three times faster than the global average. If emissions continue to increase at the current rate, then by 2051-2080 the ***average annual temperature*** in the park is projected to increase by about 4 to 6 degrees relative to the recent past. The effects of a warming climate include ***hotter maximum temperatures***, ***warmer minimum temperatures***, ***a longer frost free season*** and ***fewer days below zero per year***. In addition to influencing rates of permafrost thaw, a warmer climate will likely intensify some weather extremes, increasing the severity of heatwaves, droughts and wildfires.

Changes in Precipitation and Water Availability

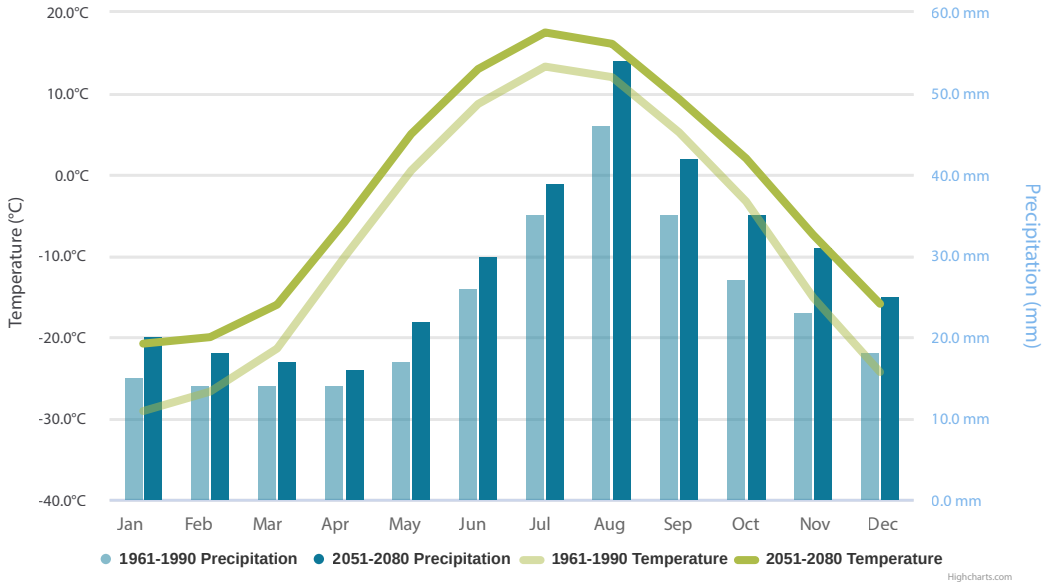
Within Thaidene Nene, ***total annual precipitation*** is projected to increase. However, because increased temperatures will lead to higher evapotranspiration rates, ***overall summer conditions may become drier*** within the park. Models also project an increase in precipitation extremes (e.g. heavy precipitation events) over that same time period. For example, the ***maximum amount of rainfall over a 5-day period*** is expected to increase by 20.3% under a high-emission scenario, relative to the recent past. Seasonal changes in temperature and precipitation (see the Climograph, p2) will likely combine to affect snow pack, stream flows, and wetland and lake levels. For example, rising winter temperatures can cause more precipitation to fall as rain rather than snow, and shift the timing of peak stream flows in spring.

Spotlight on Impacts: Barren-Ground Caribou & Climate Change

Caribou are keystone species integral to northern ecosystems and Indigenous cultures. Annual changes in temperatures, snowpack and freshwater ice will impact barren-ground caribou (*Rangifer tarandus groenlandicus*) distribution and abundance. For example, increasing wildfire activity negatively impacts lichen-rich forests within this caribou's winter range, rain on snow events increases predation by wolves, and warmer seasons bring more insect harassment. Climate change will also impact Indigenous harvesters' access to caribou.



Caribou



***Climograph** showing projected monthly temperature and precipitation values for the past (1961-1990) and future high emission scenario (RCP8.5; 2051-2080). Values represent the mean of a 24 climate model ensemble averaged over the Thaidene Nene National Park Reserve 1:50,000 NTS map (75K10), which encompasses some of the park. Figure adapted from ClimateAtlas.ca. 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 uncertainty in future emissions, climate models are run using different scenarios, called Representative Concentration Pathways (RCPs). RCP 2.6 (not shown in the table on p.1) is consistent with the 2015 Paris Agreement commitments and assumes greenhouse gas emissions peak by around 2020, and decline to zero by 2100. RCP 4.5 assumes emissions peak around 2040 and then decline. RCP 8.5 assumes emissions continue to rise throughout the 21st century.

About the Data

As per standard practice, the data in this report comes from an ensemble of 24 CMIP5 global climate models that have been downscaled to 10 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 Thaidene Nene National Park Reserve. The table below outlines some examples of these projected conditions and impacts, as well as potential options for 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 is working with Indigenous collaborators and knowledge-holders to further understand climate trends and impacts, and to develop and implement adaptation responses.

PARKS CANADA PROGRAM AREA	*FUTURE CLIMATE CONDITION*	*EXAMPLE OF LIKELY IMPACT*	*EXAMPLE OF POTENTIAL ADAPTATION RESPONSE*
Natural Heritage	Increased precipitation and runoff	Changes to water quality and quantity	Collaborate with Indigenous Guardians to monitor water quality, including impacts to fish and fish habitat, and regularly communicate results to management board members and local communities.
Cultural Heritage	Longer and drier summers	Increased wildfire risk	Identify and document cultural heritage and archaeological sites, and integrate these sites into wildfire response plans to identify appropriate measures to minimise their loss.
Visitor Experience	Shifting seasons	Extended summer and shoulder seasons	Offer more visitor experiences in the spring and fall that showcase seasonal changes.
Health, Safety & Wellness	Shorter and warmer winters	Increased travel risk due to deteriorating ice conditions	Develop a monitoring and notification system that provides real-time ice condition data to inform travel recommendations.
Built Assets	More frequent and intense precipitation events	Increased flood risk and damage to infrastructure	Relocate infrastructure (e.g., buildings, docks, and fuel caches) to better protect against damage from high water, waves, and erosion.

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.

Canada.ca/climate-services

Parks Canada works with CCCS to develop site-specific climate change summaries that inform and support adaptation planning at Parks Canada-administered places.

changementclimatique-climatechange@pc.gc.ca