

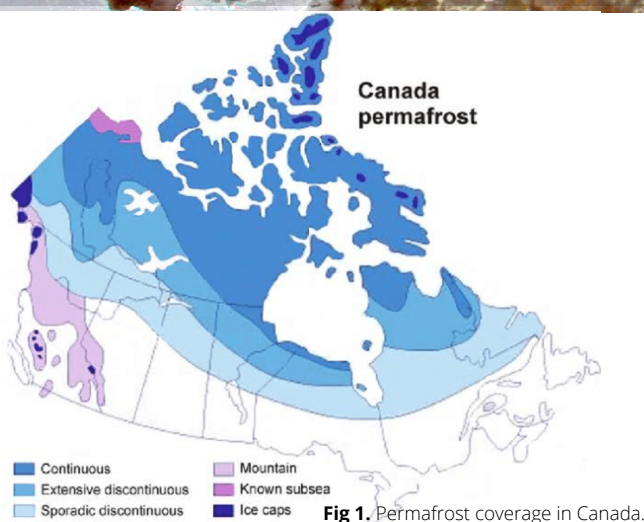
THE IMPACT OF CLIMATE CHANGE ON PERMAFROST

Image by Alexander Schneider from Canva.com [1]

WHAT IS PERMAFROST?

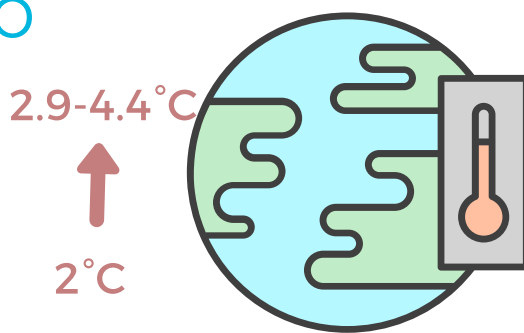
Permafrost refers to ground that has been recorded at or below 0°C for at least two straight years [2].

Permafrost is found in higher latitudes and higher elevations. It is estimated that approximately 50% of Canada has permafrost covered land [3].



PERMAFROST IS SENSITIVE TO CLIMATE CHANGE

Researchers predict that a 2°C increase in global temperature can result in 2.9-4.4°C warming in permafrost covered areas. This disproportional climate change effect on arctic environments can result in a decline in permafrost coverage ~24% [2].



PERMAFROST AND CARBON EMISSION



Fig 3. Thermokarst lakes in Vuntut National Park, Yukon, Canada. Image by Chris Kyrzyk [5]

An **active layer** refers to the top layer of permafrost that freezes and thaws annually. The active layer has been getting thicker in response to warmer temperatures. This can lead to abrupt thawing which can result in the formation of irregular landscape called **thermokarsts** [6].

Thermokarst lakes and ponds can release stored carbon in the form of green house gases back into the atmosphere. These carbon emissions can amplify the effects of climate change by trapping heat in the atmosphere [6].

Permafrost soil emissions vs Time

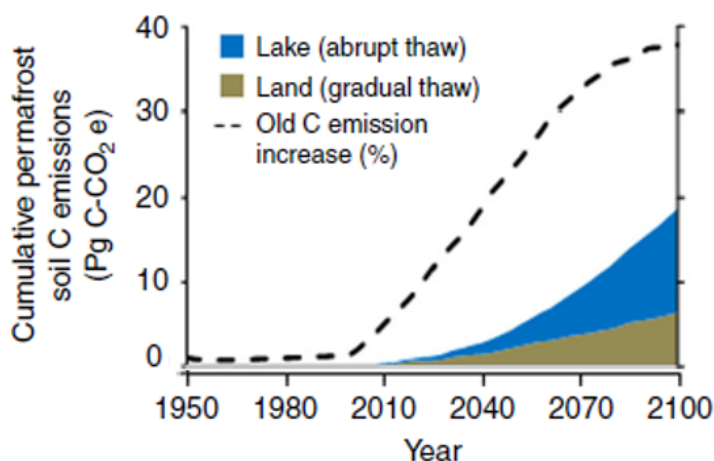


Fig 4. This graph models permafrost soil emissions through time from 1950 to 2100. This model predicts more permafrost will thaw on land and underneath lakes with time. This future thawing may release large amounts of greenhouse gases into the atmosphere that can amplify the effects of climate change [6].

IMPACT OF PERMAFROST ON CANADIAN ARCTIC COMMUNITIES

Thawing permafrost can destabilize the foundation of arctic infrastructure [7]. The effects of thawing permafrost is negatively impacting arctic communities.

There is ~51 million dollars worth of damage to infrastructure in the Northwest territories each year that has been linked to thawing permafrost [7].

Arctic infrastructure is being developed to help withstand the effects of permafrost thawing but is expensive to maintain [7].



Fig 5. Permafrost thawing related damage to a road in the Northwest territories. Image by Ryerson Clark from canva.com [1].

REFERENCES