

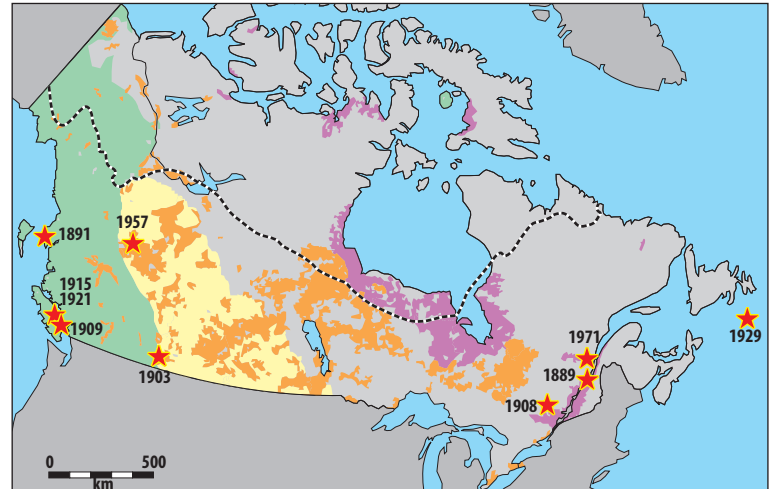


Canada's Most Damaging Landslides

Since 1840, landslides in Canada have resulted in over 600 fatalities and have cost Canadians billions of dollars – with annual costs reaching approximately \$200 - 400 million. The worst landslide in Canadian history killed 75 people in Alberta in 1903.

Landslides range in size from a single boulder falling off a cliff, to large areas encompassing many square kilometres. Thousands of small landslides occur every year. A landslide exceeding one million cubic metres (approximately 400 Olympic sized pools), occurs in Canada about every ten years. Depending on the type of landslide, debris may move at speeds ranging from a few centimetres per year up to 360 km/hr!

Landslides happen in all parts of Canada, even in areas without mountains. Four areas are particularly prone to landslides:



Map of ten major landslides

Steep slopes in mountainous terrain of western Canada (*green shading*). Landslides occur in both solid bedrock and soil and may be initiated by natural factors or human activity.

Areas of fine-grained soil in regions once covered by glacial lakes (*orange shading*) and glacial seas (*purple shading*). This includes Leda clay, the silty marine clay of eastern Canada. It has high water content and if disturbed (by river erosion, earthquake, snowmelt, construction, etc.) may turn into liquid mud and form catastrophic landslides.

Valley sides in the Prairies where rivers have cut down into the Cretaceous bedrock. This rock, deposited 65 to 114 million years ago, contains clay-rich layers that are structurally weak (*yellow shading*).

Ice-rich, fine-grained soils in permanently frozen ground (permafrost) in Canada's northern regions (*north of dashed black line*).

Although generally not deadly, landslides in the Prairies or in permafrost terrain are responsible for considerable damage to houses, roads and pipelines.

Ten Major Landslide Disasters in Canada

1971: St-Jean-Vianney, QUE. (photo to right) On May 4, following a winter of record snow and rainstorms, a sudden, huge earthflow in Leda clay destroyed 40 homes and killed 31 people.

1957: Taylor, B.C. (photo on next page) On October 16, a landslide of weak Cretaceous rock at the north end of a suspension bridge along the Alaska Highway caused the bridge to collapse. It cost \$60 million to replace the bridge - probably Canada's most expensive single cost resulting from a landslide. Luckily, there were no deaths.



Canada's Major Landslide Disasters

1929: Burin Peninsula (Grand Banks landslide),

NFLD. On November 18, following a magnitude 7.2 earthquake, a massive underwater landslide just south of Newfoundland caused a deadly tsunami that struck the south coast of Newfoundland, killing 27 people.

1921: Britannia Beach, B.C. On October 28, after heavy rain, a culvert under a railway bed became blocked, damming Britannia Creek. When the railway bed collapsed, an outburst flood swept away more than 50 houses and 37 people died.

1915: Jane Camp, B.C. On March 22, wet ground conditions combined with an initial smaller landslide caused a larger landslide of rock, mud and snow burying the homes of miners and their families under 15 metres of debris. Fifty-six people died.

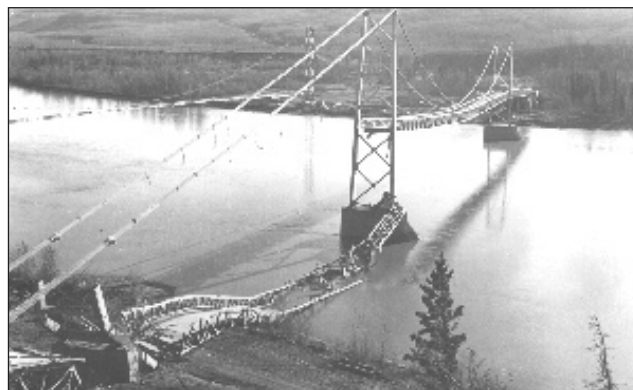
1909: Burnaby, B.C. On November 28, a landslide along a railway embankment derailed a work train, killing 22 people. Numerous derailments across Canada have been caused by landslides.

1908: Notre-Dame-de-la-Salette, QUE. On April 26, 33 people died when a landslide of Leda clay slid into the frozen Lièvre River causing a wave which swept victims away and carried large blocks of ice that crushed 12 buildings.

1903: Frank, AB. On April 29, an 82-million tonne rock avalanche from Turtle Mountain buried part of the coal mining town of Frank. Unstable bedrock, dramatic changes in weather, and the mining within the mountain were contributing factors. This is considered Canada's worst landslide disaster, causing 75 deaths.

1891: North Pacific Cannery, B.C. On July 6, heavy rains ruptured a dam created by a previous landslide. The resulting debris flow and flood overwhelmed workers' homes, killing 35 people.

1889: Quebec City, QUE. (photo below) On September 19, after heavy rain, an overhanging piece of rock face fell 90 metres, crushing houses on Champlain Street. Fifty people died.



(Photo by R.M. Hardy)

Taylor, B.C.



(Photo by William James Topley, Library and Archives Canada / PA-131073)

For further information on landslides, visit the Natural Resources Canada website:

gsc.nrcan.gc.ca/landslides

Or contact the Geological Survey of Canada office, NRCan:

601 Booth St. Ottawa, ON K1A 0E8 Phone: (613) 996-3919 info-ottawa@gsc.nrcan.gc.ca

