

Cameron Falls Trail

Geological Guide

Canada



Cameron Falls Trail

Introduction

This guide takes you on a geological walking tour of the Cameron Falls Trail and describes the rocks and geological features along the way. The hike begins in the parking lot near Cameron Falls and follows a clearly-defined path through the trees. In rocky areas where the path is less obvious, the route is marked by red metal rods topped with a blue tile. You will find the accompanying map a useful tool for navigating the trail and identifying the exposed rock-types along the way.

*Cameron Falls is located just off the Ingraham Trail (Highway 4) approximately 50 km (45 minutes) east of Yellowknife. Look for the large sign on the north side of the highway indicating **Hidden Lake Territorial Park, Cameron Falls Trail**. The trail is open year round and is about 1.2 kilometres each way. It can be completed by a moderate walker in about 50 minutes (25 minutes each way). In order to fully appreciate the*



geological features, allow more time for your walk.

The trail is a combination of packed earth, rock, and wooden boardwalks (including a 42-step wooden staircase), and is a bit steep in some places. Sturdy footwear and insect repellent are recommended. Please remember to bring your camera and a litter bag.

Along the way you may encounter a variety of trees, flowers, bushes and plants including; fireweed, foxtail barley, creeping juniper, wild roses, raspberry and cranberry bushes, paper birch, jack pine, black spruce and aspen trees. The flora and fauna of this sub-arctic environment are in delicate balance – please show respect by staying on the trail and by not picking or damaging flowers or plants.



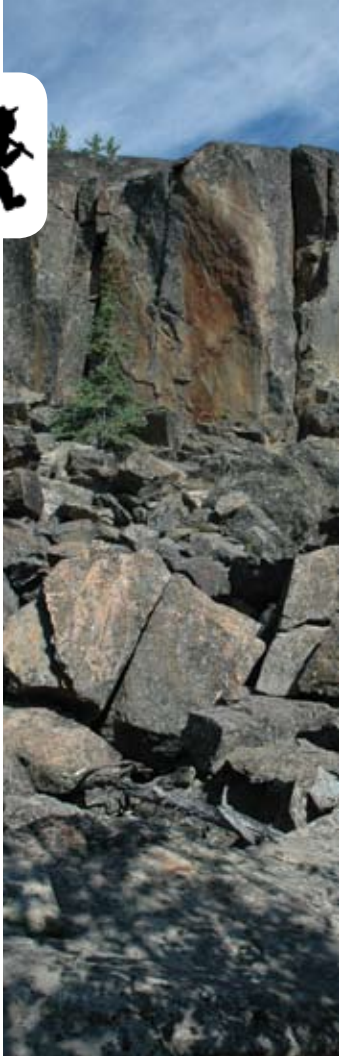
Take your time and enjoy.





Local Geology

The Cameron Falls Trail crosses over rocks of the Canadian Shield that are more than 2.6 billion years old. Much of this area was shaped by glaciers about 10,000 years ago. Most of the rocks along the trail are **sedimentary** – deposits of sand and silt in an ancient ocean that were buried and compacted to form sedimentary rocks. Later, these rocks were modified by heat and pressure – a process called **metamorphism**. There are also some **igneous** rocks along the trail: molten material from deep within the Earth which was injected into cracks in the sedimentary rocks.



Stops along the Cameron Falls Trail

Remember to refer to the map as you proceed along the trail. The guide highlights some of the interesting geological features in the area.



Stop 1

The rocks exposed in the cliff face to the left of the trail are pelitic schist that formed when sedimentary rock became metamorphic rock. Feel the bumps on the boulder lying next to the path. These are cordierite crystals that grew during the metamorphism. The origin of this cliff is likely related to a vertical fault that moved rocks on one side of the fault upward relative to rocks on the other side.



Stop 2



Between the sets of wooden steps the rocks differ in colour which indicates that they vary in composition. The black rock is pelitic schist with dark cordierite crystals whereas the lighter-coloured sandier rock is psammite (pronounced 'sam-ite').

There are also two veins – one is cream-coloured and contains quartz and feldspar and the other is white and contains only quartz. These formed when fluid moved into cracks in the existing sedimentary rock and as it cooled, quartz and feldspar crystals formed.



Stop 3

About five metres (m) past the first marker you will see a 10 to 20 centimetre-wide (cm) layer of dark-brown igneous rock called diabase that runs parallel to the lighter-coloured sedimentary layers. This sill formed after the sedimentary layer, so it is younger rock.



There is also a 10 cm-wide sedimentary layer which stands out amongst the surrounding sedimentary rock because of its lighter colour which is a result of a higher-proportion of lighter-coloured carbonate minerals in the rock.



Stop 4

At the top of the hill around the second marker, note several white quartz veins and pods. Some veins are folded whereas others have been pulled apart to form quartz pods. Quartz veins can contain gold, as proven by the number of former gold mines in this region. Look closely, you might see flecks of gold.

A large outcrop to the left of the path offers an excellent view and a good example of glacial striations. Look for pink and white granite boulders nearby that are another sign of glacial activity. The boulders were transported by ice from granite outcrops elsewhere and are referred to as erratics.



Stop 5



Near the third marker, more white quartz veins are visible within cordierite-bearing sedimentary rocks. You can also see good examples of glacial striations (scored lines and scratches in the rock surface) that run parallel to the path.



These formed approximately 10,000 to 12,000 years ago when glaciers covered much of Canada. Rocks and pebbles lodged at the base of the thick ice sheets scratched the exposed bedrock as the ice moved across the land, forming the parallel grooves.



Stop 6

At the fourth marker, notice the two sets of glacial striations. The predominant striations are parallel to the trail and are more recent than the striations that are angled to the path. This indicates that there was more than one direction of ice flow over the landscape, quite possibly during the same glaciation event. Geologists use these striations to determine the direction the glaciers moved.



Stop 7



Approximately one metre downslope from the fifth trail marker, you will see folded sedimentary rocks and some quartz veins. Elsewhere in this area you may notice that some of the lighter-coloured sedimentary rocks have

a gritty to sandy texture. These are layers of sandstone that consist mainly of quartz grains, similar to the sand found on a beach.



Stop 8

Near the sixth marker, there are shallow 'holes' in the bedrock where a layer of rock has become detached from the surface. Geologists call this phenomenon exfoliation. Repeated freezing and thawing of groundwater in cracks helps to break up the rock to form these 'holes.' Look into several of them – dark cordierite crystals are clearly seen.



Stop 9



At the seventh marker, light-coloured veins with numerous small folds can be seen. The tectonic forces (movement of the Earth's crusts) that generated these folds also caused 'pinch-and-swell' changes in the vein width. Walk around this area and discover some of these folds.



Stop 10

Around the tenth marker, the white area to the left of the trail is formed by a large quartz vein or pod. The quartz-veined boulder resting on top of it is another erratic. It is an igneous rock called gabbro and consists mainly of two minerals – light-coloured feldspar and black hornblende. The degree of rounding of a boulder can sometimes help to determine the distance it was moved.



Stop 11



Down past the bottom of the stairs, the trail continues over large boulders left by glaciers and from the nearby cliff face. This cliff may indicate the presence of another fault. The trail winds through a low area dominated by black spruce and moss. Red squirrels are commonly seen along this section of the trail.



Stop 12

*Be careful – you are standing on the edge of a cliff. This is Cameron Falls and the Cameron River which flows into Great Slave Lake. The small rise with wooden benches represents a good example of a glacial erosion feature known as *roche moutonnée* ('sheep rock'). One side has a smooth, gently sloping surface whereas the other is steep and broken up. As ice sheets passed over the area, they smoothed out the bedrock on the 'upstream' side but broke off pieces on the 'downstream' side to produce the asymmetric shape of the hill.*



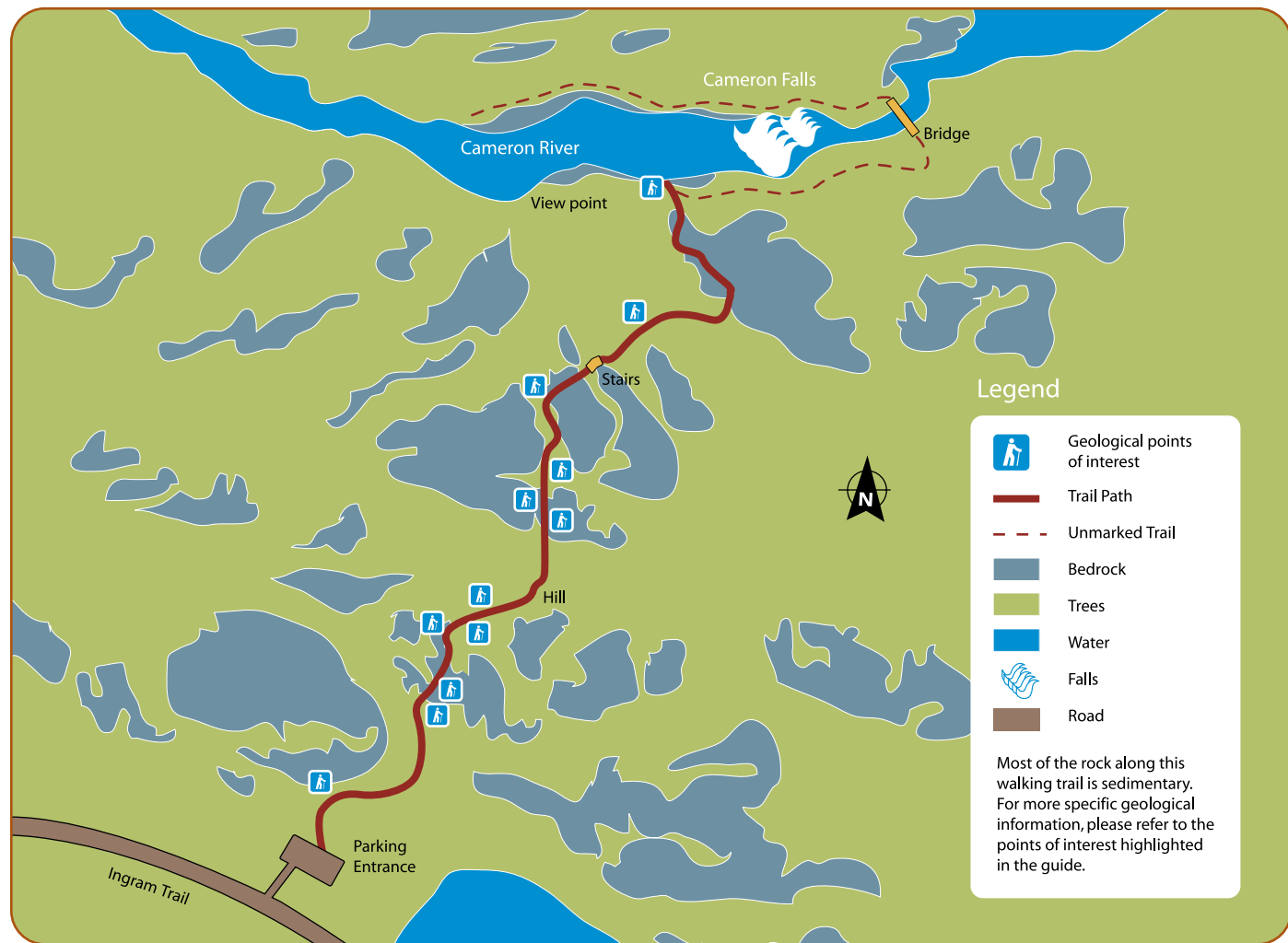
The trail along the river bank on the north side also serves as a canoe portage around Cameron Falls. The vegetation along this river bank is distinctly different, consisting of rosehip bushes and jack pines, which corresponds to a change in soil type. The ground is much more clay-rich. Soils of this type are usually deposited in still or slow-moving water, so this soil may have originally formed in a huge glacial lake that remained following the last glaciation.

The marked trail ends here. To your right when facing the falls is an undeveloped path about 250 metres long that leads to a bridge across the river. If you choose to continue along this path, please use caution.



There are a variety of geological features and rock-types in and around Yellowknife and along the Ingraham Trail. Take the time to visit some of the other walking trails: there are geological walking guides to the Frame Lake

Trail (it begins near City Hall) and the Prospectors Trail (in Fred Henne Park), and also a nature trail at Prelude Lake Park Campground. Have fun and enjoy the views as you apply your new found knowledge.



Glossary of Selected Terms

- Basalt:** *A volcanic rock formed by lava that is rich in magnesium and iron. It is often referred to as greenstone because it tends to have a greenish weathered surface.*
- Breccia:** *A textural term for rocks containing angular fragments of one or more rock types.*
- Contact:** *A place or surface where two different types or ages of rock meet.*
- Dyke:** *A long and relatively thin body of igneous rock that, while in the molten state, cut across the layers of rock it intruded into.*
- Erratic:** *A rock fragment carried by glacial ice and deposited some distance from the rock outcrop it originally came from, and generally, but not necessarily, resting on bedrock or sediment of different composition.*
- Exfoliation:** *The process by which scales, plates or sheets of rock, from less than a centimetre to several metres in thickness, are stripped from the bare surface of rock.*
- Fault:** *A crack or fracture in the Earth's crust along which movement has taken place.*

Gabbro: *A dark greenish-grey plutonic rock that is coarser-grained because it cooled slowly below the surface of the Earth.*

Geology: *The science concerned with the study of the Earth's processes including the rocks and minerals that make up the Earth.*

Glacial Striations: *Parallel grooves scratched into exposed bedrock by rocks and pebbles lodged at the base of thick ice sheets (glaciers) as they moved across the land. Geologists use these to determine the direction the glaciers were traveling.*

Granite: *A coarse-grained (intrusive) igneous (plutonic) rock consisting of quartz, feldspar and mica. The Cameron River Trail has both pink and white granite boulders along its length.*

Igneous Rock: *Rocks that have solidified from a molten material (magma) that originated deep below the surface of the Earth where the temperature and pressure are high. If the magma finds a path to the surface, it erupts, cools quickly and solidifies to form a fine-grained Volcanic Rock. This is like the present day activity on Hawaii or Iceland. If the magma never reaches the surface, it slowly cools and crystallizes deep below and forms*

a coarse-grained Plutonic Rock which is later exposed by erosion.

Metamorphic Rock: *Rocks which have undergone a change in texture or composition as the result of heat and/or pressure. Most of the igneous rocks in the area are metamorphosed (changed).*

Pegmatite: *A coarse-grained (most grains are larger than 1 cm) igneous rock, usually irregular in texture and composition and similar to a granite in composition; it usually occurs in dykes or veins.*

Roche moutonnée: *A rock which has been shaped by ice flowing over it. The side the ice came from is smooth and the side it retreated from is steep and broken up. This irregular erosion allows glaciologists to trace the movement direction of the ice.*

Sedimentary Rock: *Rocks that are created by the erosion of other rocks and deposited by surface processes such as wind, water (lakes, rivers, oceans) and glaciers. Sedimentary rocks form where sediment (eroded particles) accumulates – such as the sand on the bottom of lakes, along shorelines and even in deserts (dunes). As the sediment builds up, it is subjected to pressure so it compacts and consolidates to form a sedimentary rock such*

as sandstone. Other sedimentary rocks include mudstone, salt, coal and limestone.

Tectonic event: *Movement within the Earth's crust that caused rocks to become deformed (folded, faulted).*

The Earth's crust consists of fragments (plates) that move in relation to one another, shifting continents, forming both mountains and new ocean crust, and causing volcanic eruptions.

Vein: *A typically thin, sheet-like body that infills a crack in the rock. A vein can contain one or more mineral types. Quartz veins are common along the Cameron Falls Trail.*

*For further information on trails, facilities, or general travel,
please contact:*

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