United Nations Educational, Scientific and Cultural Organization

Stonehammer UNESCO Global Geopark

REVERSING FALLS RAPIDS

DRIFTINGAPART

STONE HAMMER

Conservation designations: *Stonehammer UNESCO Global Geopark*

Grid reference: GPS: 45.2642664, -66.0880366

Address: 100 Fallsview Ave, Saint John, NB E2K 0G8

Parking available: Yes

Personnel to be contacted prior to visit: City owned public park fully accessible year round, not pre contact required

Driving Directions:

Please note there are multiple areas related to Reversing Falls Rapids story. Fallsview Park is located off Douglas Avenue (West Saint John) at the end of Fallsview Avenue. Skywalk Saint John is located at Reversing Falls Bridge on NB-100. Wolastoq Park is located on Lancaster Avenue

Site specific hazards and risks:

- Traffic
- Seasonal maintenance, ice possible
- Open water, strong currents

Useful Equipment:

- Camera
- Binoculars

RELEVANCE PROVINCIAL CURRICULUM

Grade 7 Unit 2 Earth's Crust. *Examine catastrophic events that occur on or near the earth's surface-volcanoes, earthquakes; explain the process of mountain formation and the folding and faulting of earth's surface; develop a chronological model or time scale of major events in earth's history; classify and describe rocks on the basis of their transformation in the rock cycle; explain various ways that rocks can be weathered; describe how plate tectonic theory has evolved in light of new genealogical evidence.*

Grade 8 Unit 1 Water Systems on Earth. *Unit 1 How waves and tides are generated and how they interact with shorelines; processes of erosion and disposition that result from wave action and water flow, processes that lead to development of ocean basins and continental drainage systems.*

Grade 9 Social Studies 9.2.1 *Demonstrate an understanding of the basic features of Canada's landscape and climate: explain the creation and characteristics of mountains and plains; examine a map showing the earth's major plates and their direction of movement; identify zones of compressional and zones of tensional forces; Physical weathering or chemical weathering; use block diagrams (i.e., cross-sections) to describe the landform features resulting from continental glaciation (e.g., medial moraine, terminal moraine, esker, drumlin, and erratics) and alpine glaciation (e.g., medial moraine, terminal moraine, hanging valley, horn); develop a photo-essay to illustrate some of the coastal features formed by wave action (e.g., tombolo, spit, bay beach, stack, sea arch, sea cave); 9.2.4 analyse the effect of geographic features on the development of Canada and of a selected country with similar geographic features.*

Physical Geography 110: *Geological emphasis Unit 5G: From Continental Drift to Plate Tectonics: Field Work and Local Studies*

Canadian Geography 120: *The Physical Basis of Canadian Geography: evolution of the Canadian landscape through geologic time; landform processes.*

Mitigation measures:

- Park in designated areas
- Do not collect rocks or fossils
- Do not feed or disturb wildlife habitat
- Do not litter
- Find out whether the tide is going in or out and the next high or low tide occurs

Topics to cover before visit Plate tectonics, Ice Age, Fundy Tides, Wolastoqiyik culture, erosion and the Wilson Cycle

Keywords Continental Collide, Plate tectonics, Ganderia, Avalonia, Gondwana, Laurentia, Rheic Ocean, Iapetus Ocean, Wilson Cycle, Terrane, Contact, Pangaea, Cambrian, Glaciation, Moraines, Koluskap, Fundy Tides, Graphite Mining, Seals, Cormorants, Pulp Mill, Log Drive

Rock types and geological processes observed Wilson Cycle, Plate tectonics closing Iapetus Ocean. Caledonia Fault visible contact, Brookville (Precambrian marble) and Caledonia (Cambrian sandstone and shale) Terranes and Ice age erosion.

Geological structures Fault, gorge, fossils

Earth Processes Landslides, volcanoes, mudflow seabed sediment, continental drift, continental crust fragmentation, graphite mining, glaciation and erosion.

Geological periods present Precambrian, Cambrian, Ordovician, Quaternary

Did you know?

The Reversing Falls are famous for the tidal phenomenon that forces the Saint John River to flow backwards as the Bay of Fundy reaches high tide. The difference in tide can be 8 metres! A narrow gorge where the river flows out to the sea and an drowned waterfall make for powerful rapids and whirlpools at low tide, which are brought to a standstill by the rising tide. High tide sees rapids flow in the reverse direction as the tide water forces its way upstream, before another slack tide brings a period of calm and then low tide frees the river's flow to the sea again approximately 12hrs 25 mins later as the cycle continues.

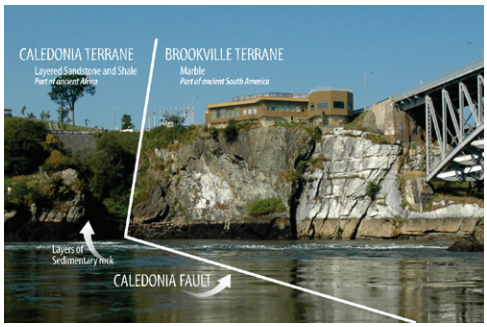
Geological history*

The geological story here is a story of plate tectonics and the collision of ancient continents. Here you can see the contact of two ancient continental fragments that began their story far, far away. Looking across the river, north of the bridges, the light gray marble rocks are Precambrian age, perhaps a billion years old, part of Ganderia, a fragment of crust once attached to South America. To the south are darker Cambrian shale and sandstone rocks 542 to 490 million years old, part of Avalonia, a fragment of crust once attached to Africa. Each rock type was formed, 500 million years and many miles apart, from shallow ocean sediments on the margins of the ancient continents.

Geologists call these fragments of crust, terranes, pieces of the earth's crust that have broken off one continental plate and attached to the crust on another continental plate. In this case, South America and Africa's continental plates had pieces break off that attached to North America's, and right here you can see them extremely well.

The Wilson Cycle, or the cycle of opening and closing of ocean basins, is an integral element of the Drifting Apart story as it explains how oceans such as the ancient Iapetus Ocean open and closed over many millions of years. Ocean closure was enabled by subduction of the ocean floor underneath a continental plate, which created a lot of volcanic activity. The volcanic rock in surrounding geosites in Stonehammer provide evidence of this activity, as do the convoluted deformation of the earth's crust visible in folding and thrusts in the area. Fossil stromatolites in the Brookville Terrane are the oldest evidence of life in the Drifting Apart area which clovers many thousands of miles!

Two continental fragments collided here during the closing of the Iapetus Ocean. Left is marble of the Precambrian Brookville Formation associated with Amazonia (proto South American continent) and right is sandstone and shale from the Cambrian Caledonia Formation associated with Gondwana (proto African continent).



The Caledonia faultline runs through the Stonehammer Geopark area.

Trilobite fossils are found throughout the Cambrian sandstone and shale in Saint John. Many important specimens, including type fossils of certain species, are found in the NB Museum collection. The rocks this fossil came from have been studied extensively to develop a time frame for Cambrian rocks worldwide.