A Walking Tour of Rocks, Minerals And Landforms of Victoria Park, Truro

Nova Scotia
Department of Mines and Energy

Information Circular 11

INTRODUCTION

Victoria Park is now 100 years old. It possesses an abundance of natural beauty and has endured a long geological history. In celebration of the Park's centennial year during 1987, the Truro Parks and Recreation Commission and the Nova Scotia Department of Mines and Energy prepared a walking tour of the Park.

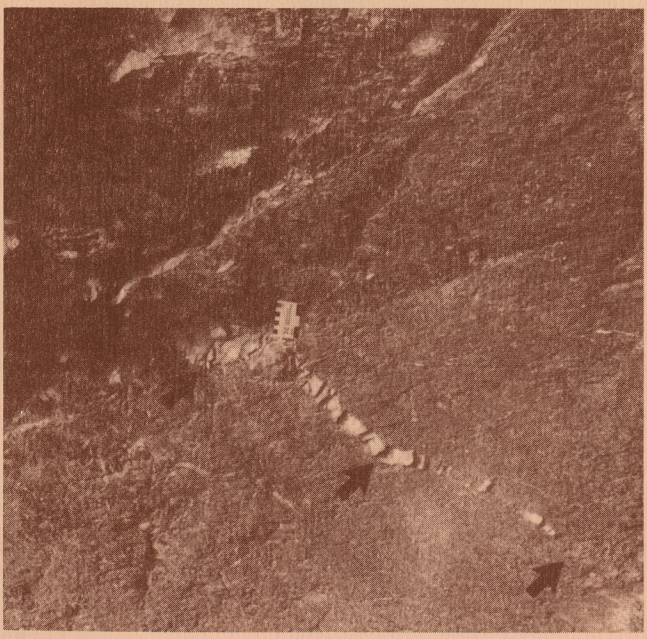
This self-guiding walking tour will highlight the geological history written in the rocks and will describe the development of the landscape. As you learn about the rocks and landforms of the Park, you will appreciate how interesting they are and how geologists work to unravel the geological history of such an area. Another important purpose of this walk is to learn how early settlers in the area used the local rocks, minerals, and various landforms for mining, farming, and commercial development.

This walking tour is one of many developed by the Nova Scotia Department of Mines and Energy. "Hands-on" projects like this provide participants with an opportunity to discover more about the geology of the Province, its mining history and development, and how geologists look at the rocks and landforms. Support for the Victoria Park Walking Tour and other public information projects is provided through the Public Information Program of the Canada-Nova Scotia Mineral Development Agreement (CNSMDA). A wide range of projects designed to develop Nova Scotia's mineral exploration, mining, and mineral manufacturing industry are supported by this Agreement.

A Few Reminders

Please be very careful when under overhanging rock or when above someone else. Cliffs have very good rock exposures, but are dangerous because of potential rock falls.

Please leave rocks, flowers, ferns, etc. in their natural habitat so that others may enjoy them. If you would like to collect a rock sample, take one from the pile of rocks found along the base of the cliffs.



Evidence of Earthquakes at the Holy Well Section. The long tapered crack (see arrows), probably resulted from an earthquake. The hard shale was broken and cracked by the land movement of the earthquake and later filled with mud from the next river flood.

Early History of the Park

The nearly 162 ha (400 acres) of land which comprises Victoria Park originated as private property that was donated to the Town of Truro to be used as parkland. In 1887, many residents of Truro discussed developing a park as part of the golden jubilee celebrations of Queen Victoria's reign. Much of the land that now forms the Park belonged to the Ross and Waddell families. James D. Ross, son of John Ross, donated the land in 1887. During that year, the Trustees of Victoria Park was established and was chaired by Sir Adams G. Archibald — father of confederation and a former lieutenant governor of Nova Scotia. In the summer of 1887, Susan Waddell Stevens donated a large parcel of land to the Town of Truro for park use. This land and that of James ("Park Jimmy") Ross formed the nucleus of Victoria Park. Over the years, Ross, a well-known barrister in Truro, donated more land and worked actively to make the Park what it is today. "Park Jimmy" Ross contributed to the development of Victoria Park is recognized by a granite monument in the lower park.

Operation of the Park

Victoria Park is operated and managed by the Truro Parks and Recreation Commission. Seven members, appointed by the mayor, comprise the Commission: four are town councillors and three are private citizens. The Commission also operates and manages the arena, ball fields and green spaces in Truro. It provides financial support to local community groups for recreation programs.

Mountain Building. Closely spaced fractures in the shale are called cleavage by geologists. Cleavage forms when the rocks are greatly compressed during mountain building. This well developed cleavage is found at the Holy Well.

Front Cover. Joe Howe Falls. Thick, hard sandstone layers are very resistant to erosion. These sandstones were deposited in channels of ancient rivers. Some channels were as big as 4 m deep and 30 m wide.

VICTORIA PARK HAS MANY FEATURES

Landforms: Influence of Water and Ice

Victoria Park is located on the south side of the Salmon River Valley where Lepper Brook tumbles from higher elevations to nearly sea level. In the upper reaches of the Park, the valley of Lepper Brook is a gorge almost 130 feet (40m) deep. At the bandshell, the valley consists of a channel for the brook and a broad, flat floodplain. These features are typical of river valleys — the Salmon River has a channel controlled by dykes and a very wide floodplain.

A stream that passes over very hard rock will usually have rapids, cascades and waterfalls. Such is the case with Lepper Brook. By comparison, the Salmon River flows across very soft rock and has a wide floodplain.

Most of the landforms in the Park were created by running water. However, glaciers have also influenced the shade of the land. The latest glaciation began more than 50,000 years ago. Since then, these mountains of ice have advanced and retreated many times. By 10,600 years ago, enough ice had melted for a nomadic people to establish themselves in the area around present day Debert.

The effects of glaciation can still be seen today. For example, the Lepper Brook valley was deepened by glacial erosion. Large amounts of sand and gravel were deposited in many locations in the Truro area. In the Park, the bedrock is covered by a thin layer of sand- to boulder-sized material called glacial till.

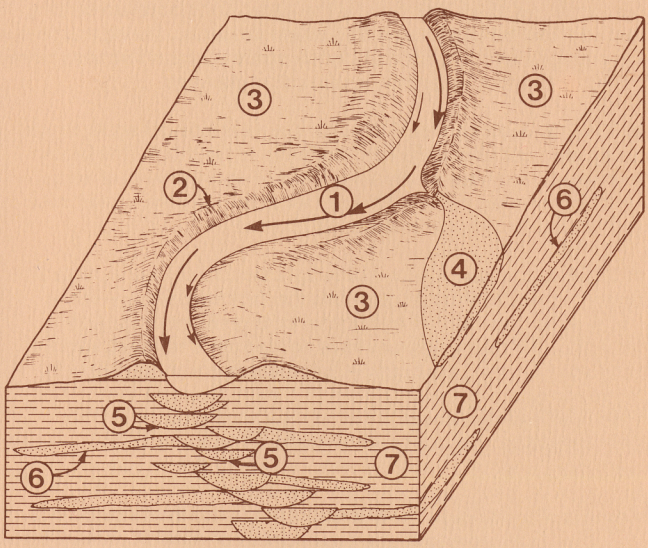


Diagram of a Typical Stream System Through Time.

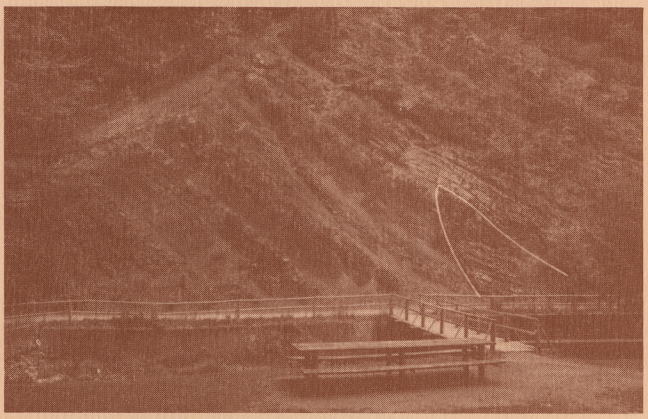
1. *MAIN CHANNEL: Length of arrows indicate maximum velocity.*
2. *NATURAL LEVEE: Formed by the deposition of sand and mud during floods.*
3. *FLOOD PLAINS: Generally lower areas beyond the levees.*
4. *LEVEE BREAK: Flood produced levee breaks add a flat layer of sand on top of the flood plain mud deposits.*
5. *OLD CHANNEL DEPOSITS: Sand lenses with curved bottoms and flat tops.*
6. *OLD LEVEE BREAKS: Sand layers with flat tops and bottoms produced by levee breaks in the past.*
7. *OLD FLOOD PLAIN DEPOSITS: Layers of mud deposited on previous flood plains.*

The Bedrock

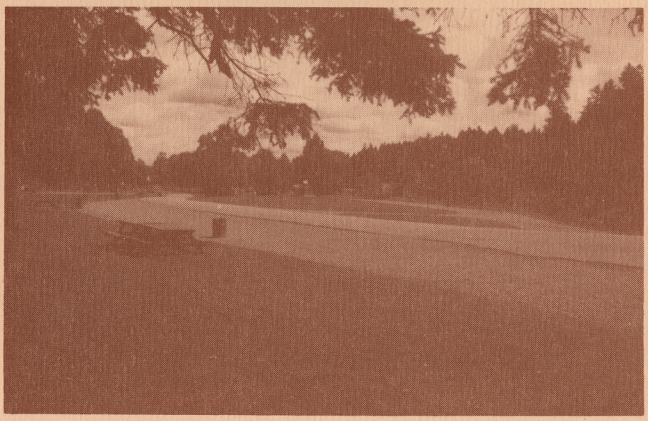
Two groups of rocks are exposed in the Park. The gorge and waterfalls have been created by the erosion of the red sandstone and shales of the Horton Group which are about 360 million years old. Geologists suggest that these rocks were originally river deposits.

The younger of the two groups is the Wolfville Formation. These red-orange sandstones and conglomerates are about 220 million years old and are exposed downstream of the Serpentine Drive bridge. They were deposited in desert-like conditions during the Triassic period of time. The two rock units are separated by an unconformity that represents at least 140 million years when either no rocks were deposited or rocks were stripped away by erosion.

The valley of Lepper Brook may be very old. Layers of Wolfville Formation are found downstream of the bridge near the picnic pavilion. The valley walls are already quite high at this location. Geologists interpret the rocks and landscape to indicate that during Triassic time a valley was eroded and then filled in by sand and gravel that is now the Wolfville Formation. Much later, present day erosion by glaciers and running water exposed the ancient valley. Now Lepper Brook flows through part of a valley that was first formed more than 220 million years ago!



Holy Well Section. This large exposure of Horton Group rock in the cliff face shows continuous layers of shale from one side of the cliff to the other. Geologists interpret the shales to have been mud deposits formed on the flood plain of an ancient stream valley more than 365 million years ago. A large stream channel (outlined in white) had been cut into the flood plain deposits by a major river before the deposits were compacted into rock.

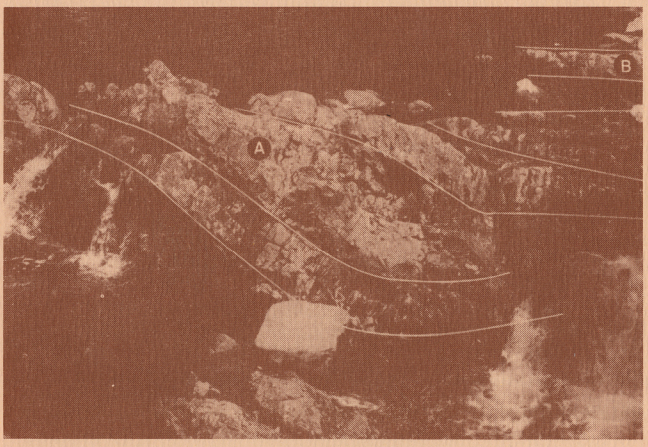


Evidence of Man

Agriculture and forestry have long been the mainstays of industry in the Truro region. The Acadians developed the fertile floodplain areas of the Salmon River during the 1600s and early 1700s. After the expulsion of the Acadians in the middle part of the 1700s, British settlers and later loyalists escaping the newly formed United States, continued the settlement of the area.

Shipbuilding became an important industry in Truro due to the nearby tidewater and supply of timber. The sandy loam on the upland slopes, which are underlain by the Horton Group of rocks, supports a forest of spruce, fir, white birch, red maple, hemlock, and white pine. Many of these trees were used in shipbuilding. Nearby at Maitland, the *William D. Lawrence,* the largest full rigged wooden ship in Canada, was built in 1874.

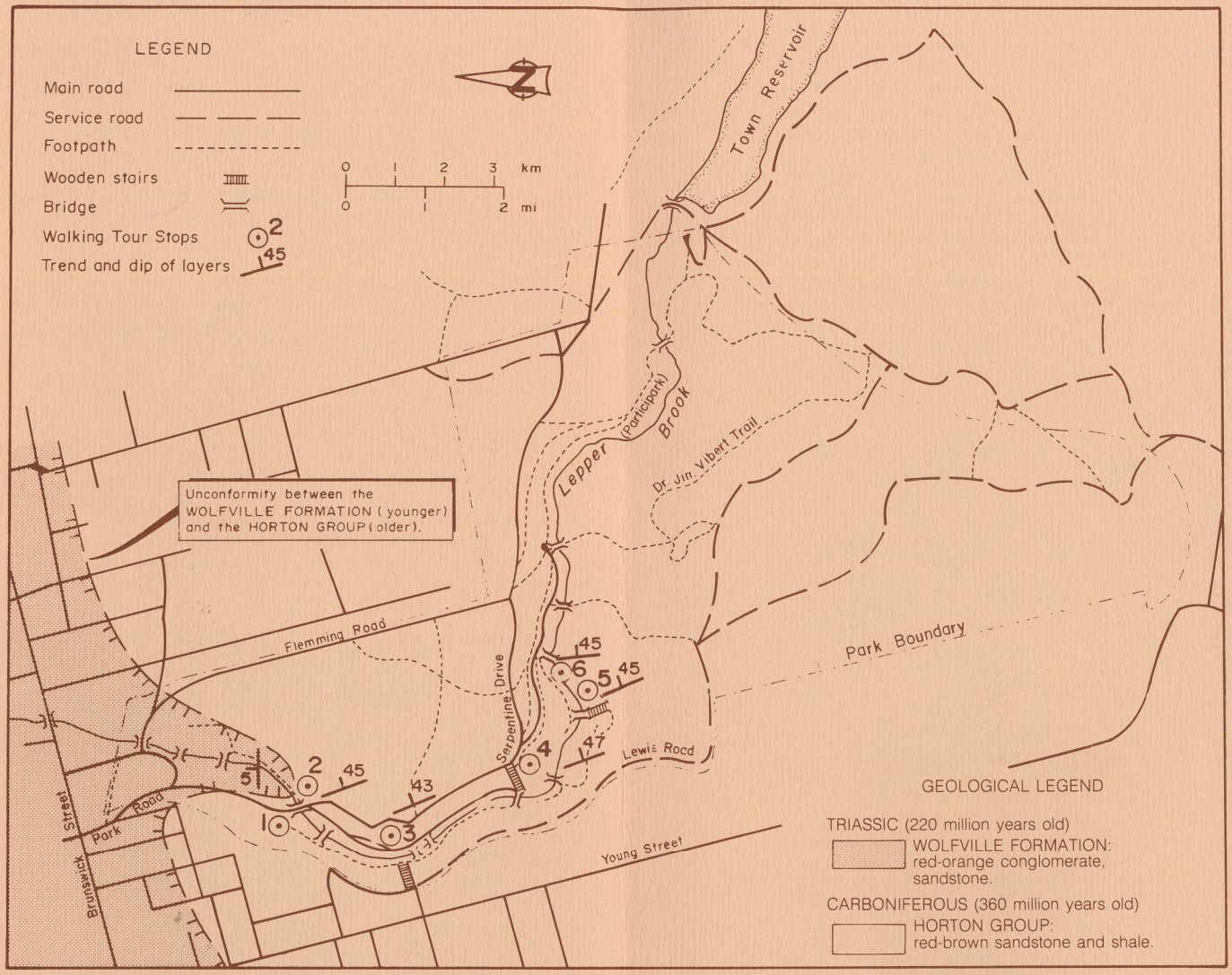
The rocks underlying the forest also contains riches. With the gold rush of 1860, people prospected for gold everywhere in the Province. Although no gold was found near Truro, many other metals and non-metals were discovered. Large deposits of iron ore were found at Londonderry in 1849. By the 1870s, an iron and steel industry was well established. Some of the water pipe used in Truro and other Nova Scotia communities was cast at Londonderry. Rails for the Intercolonial Railway (predecessor of Canadian National) were also made at the iron works. Other metals were found and mined in the area: manganese north of Truro, lead at Smithfield and copper-lead-zinc-silver at Walton. The former mine at Walton was the largest open pit barite mine in the world. Coal was mined at Debert and Kemptown. Glacial deposits have been the source of much sand and gravel quarrying. Clays and shales around Shubenacadie are made into bricks at Lantz. Limestone for cement and barite are mined at Brookfield, south of Truro.



Joe Howe Falls. The sandstones at the edge of the pool were deposited in channels. All of the layers around "A" are channel deposits with curved bases. Note the straight bases of sandstone layers at "B" which were deposited on a floodplain.

(Left). Lower Park. The broad, flat floodplain of Lepper Brook covers most of the lower park. Small exposures of conglomerate belonging to the 200 million year old Wolfville Formation can be seen downstream of the Serpentine Drive bridge. The Wolfville Formation underlies the lower park and the flat areas of the Salmon River Valley.

Map of Victoria Park



WALKING TOUR

The accompanying map shows the extent of Victoria Park and the location of the stops. We suggest that you follow the stops in numerical order from 1 to 6.

Walking Tour STOPS

■ **STOP 1. Picnic Pavilion.** Lepper Brook flows out of the narrow valley into a broad floodplain where most of the Park's recreational facilities are located. It is possible to distinguish the valley walls, flat floodplain and channel.

■ **STOP 2. Beneath the Road Bridge.** Located downstream from the bridge are orange-red coloured sandstone and conglomerates of the Wolfville Formation. The exposure is very poor and is partially hidden by the abundant glacial till in this area of the brook. Geologists interpret the rocks of the Wolfville Formation to have formed on the slopes of an alluvial fan in desert-like conditions. The flat lying layers rest unconformably on steeply tilted sandstones of the Horton Group.

Upstream under the bridge, the red-brown sandstone and shales of the Horton Group are exposed. Notice that the layers under the bridge form higher ridges than some other areas nearby. These ridges are hard layers of sandstone, composed of quartz grains, that are resistant to erosion by the running water. A short distance downstream, the softer, less resistant shale forms a flat channel bottom in Lepper Brook.

Sandstone beds under the bridge provide geologists with a great deal of information. Most of the beds are very uneven in thickness and represent shallow water channels of small streams. The finer grained siltstones were deposited when the river periodically overflowed its banks and covered its floodplain. Gradually, the mud settled, leaving layers of silt and mud.

■ **STOP 3. Pumphouse Exposure.** At this location, Lepper Brook valley becomes much narrower, although the brook still has a well-defined channel and floodplain.

The rocks of the Horton Group consist mainly of red-brown shales. The layers are straight and extend from one side of the outcrop to the other. This contrasts sharply with the layers of sandstone under the bridge which pinch and swell in thickness. A few resistant layers of sandstone stand out on the cliff face. These represent flood stage deposits when the river breached its banks and overflowed onto the floodplain. The large amounts of shale indicate that these rocks were all deposited on a floodplain.

Notice how much loose rock (talus) has accumulated at the base of the cliff. This rock was broken from the bedrock by freezing and thawing, wetting and drying, and the wedging action of plant roots.

■ **STOP 4. Holy Well Section.** This large cliff face offers an excellent view of thick layers of red-brown shale alternating with more resistant, thinner sandstone beds. The shale layers show that the floodplain was occasionally covered by muddy water. Whenever a bank or levee was breached during a major flood, large amounts of fast flowing water and sand poured out of the channel onto the floodplain. This gave rise to the long thin layers of sandstone.

One of the shale beds (see picture) contains several "veins" of sandstone cutting across the shale layers. The vein was formed when a large crack opened and was filled in by sand. Some geologists believe the cracks were made by earthquakes.

Perhaps you have noticed that the layers of rock are not horizontal, but tilted. This tilting is the evidence of mountain building that affected the rocks about 320 million years ago. During that time the pressure was so great that closely spaced parallel fractures were formed in the rock (especially shale) called cleavage.

■ **STOP 5. Wishing Well Stairs.** On the west side of Lepper Brook, a long staircase descends from the hilltop to the brook. The brook follows a deep ravine which is the result of water erosion of a non-resistant shale layer. Running water will often seek the easiest rock unit to erode in order to establish its channel.

■ **STOP 6. Joe Howe Falls.** These spectacular falls were created when Lepper Brook could not erode the thick sandstone — it was easier to cascade and fall over these more resistant beds. As you walked up the valley, you may have noticed more resistant layers of sandstone crossing the brook — these layers are all old channels. Some are quite small — only 0.5m (1.5 feet) deep and 4m (13 feet) wide. The thick sandstone at the falls is a huge channel 3m (10 feet) deep and 10 to 15m (32 to 50 feet) wide. This ancient channel could carry more than 100 times the water in Lepper Brook. Almost all of the rocks located at and above the falls are ancient river channel deposits of sandstone. The placement of the falls at this point was undoubtedly influenced by the large number of vertical cracks in the rock called joints or fractures.

WOULD YOU LIKE MORE INFORMATION?

If you would like more information about recreation facilities in Truro or their use, please call the Recreation Office at (902) 895-4484.

For further information about rocks, minerals or mining in Nova Scotia, call the Department of Mines and Energy at (902) 424-4700.

Nova Scotia

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