



## GEOLOGICAL HISTORY OF THE MANITOBA ESCARPMENT

The land mass of Canada can be divided into four basic geological and geographical elements – the Canadian Shield, the Interior Plains, three mountain systems and two coastal plains. Two additional elements, the continental slope and continental shelves are submerged in the surrounding oceans. Riding Mountain National Park (RMNP) is located on the eastern edge of the interior plains, southwest of the Canadian Shield.

Beginning in the Ordovician period (500 million years ago) and extending to the start of the Tertiary (65 million years ago), the central portion of what is now Canada was inundated by a series of semi-tropical oceans. Each submersion lasted for a long period of time and the deposits of sediments that resulted subsequently solidified to form vast, thick sheets of relatively flat lying shales and limestones.

Exposure of this **bedrock** is restricted to a few areas such as the Vermillion and Ochre River Valleys and on portions of the face of the escarpment. The bedrock is composed almost entirely of shale from the Cretaceous period (100 million years ago). Intermixed with the shale are layers of volcanic ash called bentonite, which originated from volcanic activity associated with the building of the Rocky Mountains in the west. This bentonite layer, along with the shale, yield fossil remains of sharks, fish and other organisms that inhabited oceans of the time.

During the Cenozoic era (70 million years ago), the last of the oceans drained in great rivers that flowed across what is now Manitoba, wearing away the shale to form an immense valley. The western side of this valley remains today as the Manitoba Escarpment, a small portion of which is preserved in RMNP. In total, the escarpment runs over 800 km across eastern Saskatchewan, Manitoba and into North Dakota. It isn't a continuous linear rise of land but rather a string of low hills separated by valleys, demarcated to the north by the Valley River Valley and to the south by the Assiniboine River Valley. The eastern portion of RMNP is dominated by a steep escarpment face, which rises 450 m above the Manitoba Plains.

Several glacial advances and subsequent retreats, the last of which occurred some 10,000 years ago, have largely determined the present-day configuration of the land. In the last advance, two lobes of glacial ice, one from the northwest and a second from the northeast met at an interface paralleling the escarpment. This meeting created an interlobate **moraine** along the escarpment crest in the southeastern part of RMNP. Retreating lobes of ice left stagnant glacial ice masses everywhere; even on higher ground, sometimes lodged under the surface of the earth. When these later melted, an irregular pattern of hills, lakes and ponds called knob and kettle topography was formed. Meltwater from the retreating ice carved out many channels including those now occupied by the Birdtail and Rolling Rivers in RMNP. Meltwater from all of southern Manitoba collected in the flat basin of the Manitoba Lowlands, forming glacial Lake Agassiz.



In this area, the Manitoba Escarpment formed the western shore of that lake. Beach ridges and water-lain deposits from Lake Agassiz parallel the base of the escarpment. Remnants of that great lake include Lakes Winnipeg, Manitoba, Winnipegosis and Dauphin.

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