



THE RIVER VALLEY ALLIANCE

Alberta's Capital Region River Valley Park

Creating a legacy... for generations to come

Geological History

The history of the North Saskatchewan River Valley extends over 2 million years. Currently a shallow meandering river of 1 to 3 meters in depth, the North Saskatchewan River originates at the Saskatchewan Glacier and the Columbian Icefield, now a vestige of the Cordilleran ice sheet. On its 2200 kilometer journey to the Hudson Bay, the river has, over time, cut and shaped the existing valley walls. Some of the youngest geological rocks are exposed along this valley. As the river winds through the 88 kilometers of the Capital Region River Valley Park, an interesting story unfolds.

Significant geological events helped create the terrain and composition of this valley. During the Mesozoic era, volcanic eruptions spread ash clouds as far as the Edmonton region resulting in the formation of bentonite clay, evident along the river between Emily Murphy Park and the High Level Bridge, extending into the Whitemud Reserve. At the same time, the Devonian Sea covering much of the area in the then tropical climate left behind rich organic materials, which gradually transformed into large oil and gas reserves. Layers of the fertile material also formed coal seams in the valley. The coal mining areas can be seen by Greirson Hill, the Dawson Bridge, where old mine entrances are still visible today, and in the Whitemud Reserve.

The Cenozoic Period was marked by mountain building and eroding and continued until the glacial ice age, 1.5 million years ago. At this time Edmonton was covered with a 1.5 kilometer thick ice blanket. As the glacier ice from the north and northeast met with the eastward moving Cordilleran ice sheets from the Rockies, detritus (molasses) produced from the eroded mountains, was deposited on the plains creating a portion of our sands and gravel.

Boulders and debris were left behind as the glaciers receded scouring the earth with their movement. This resulted in the knob and kettle topography noted on the landscape today. Erosion forces of strong winds created sand dunes out of the light glacial sands. These dunes are now evident around Devon and Fort Saskatchewan. Large deposits of silt and clay can be seen by Glacial Lake in the upper most layer of the river valley.

Much of this geological layering can be seen in the Capital Region River Valley Park at the Big Bend of the river near Terwillegar Park. The bedrock layer is mostly hidden by the water level. The first visible layer is sand and gravel from 22,000 years ago. The yellow colored layer of fine clay and more angular rocks is the sediment from the glacier from the Canadian Shield moving through the area 12,000 years ago. These features are best seen from the river but with a sharp eye or good pair of binoculars, they are visible from Terwillegar Park.



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Evidence of other continental occurrences can also be seen in our valley walls. Near the south bank of the LRT bridge in Edmonton, a thin layer of white ash is visible. This came from Mt. Mazama, a great volcanic eruption in Oregon, 1500 kilometers from Edmonton, which spread its ash plume over 1.3 million square kilometers, some of that area reaching into Alberta.

Other features one might see while traveling on the river or walking the trails are water springs running into the river. These springs are the ground water flowing along the preglacial river beds. Wherever the North Saskatchewan River has eroded the bank to expose the intersecting channels, springs emerge. The best example of this is located below the Museum in Government House Park.

All along the river one finds gravel bars and sand spits and in some areas, note the area between Beverly and Fort Saskatchewan, large gravel pits. These gravel deposits from glaciers and rivers continue to provide a viable industry within the area. Among these gravel pits are another example of our geological history – petrified wood. This wood originated in the warmer climatic period more than 60 million years ago. When the trees died they were buried in the mud and the silica rich ground water penetrated the tree cells. Quartz grew in the cells replacing the tissues of the tree. For centuries the trees were then protected under layers of sedimentary rock. Petrified wood has now been eroding out of the gravel beds and can be found in gravel sites. Petrified wood is the Alberta Provincial Stone.

The river valley is prone to erosion because of the nature of the banks and the river flow. The inside bend of the river accumulates material from the river while the undercutting on the bank on the outside of the bend causes slope instability followed by slumping. The nature of the soils especially the bentonite, and the springs in the old river beds, allow for this sliding to occur. The river banks by Hawrelak Park, Whitemud Drive, Rossdale, Riverdale and Ada Boulevard are good examples of this feature. (other sites in the CRRVP).

By taking time to look carefully at the valley walls, a fascinating story emerges making our valley one of unique interest.

References:

Travellers's Guide to Geological Wonders in Alberta by Ron Mussieux and Marilyn Nelson
Edmonton Beneath Our Feet
Edited by John Godfrey
produced by the Edmonton Geological Society