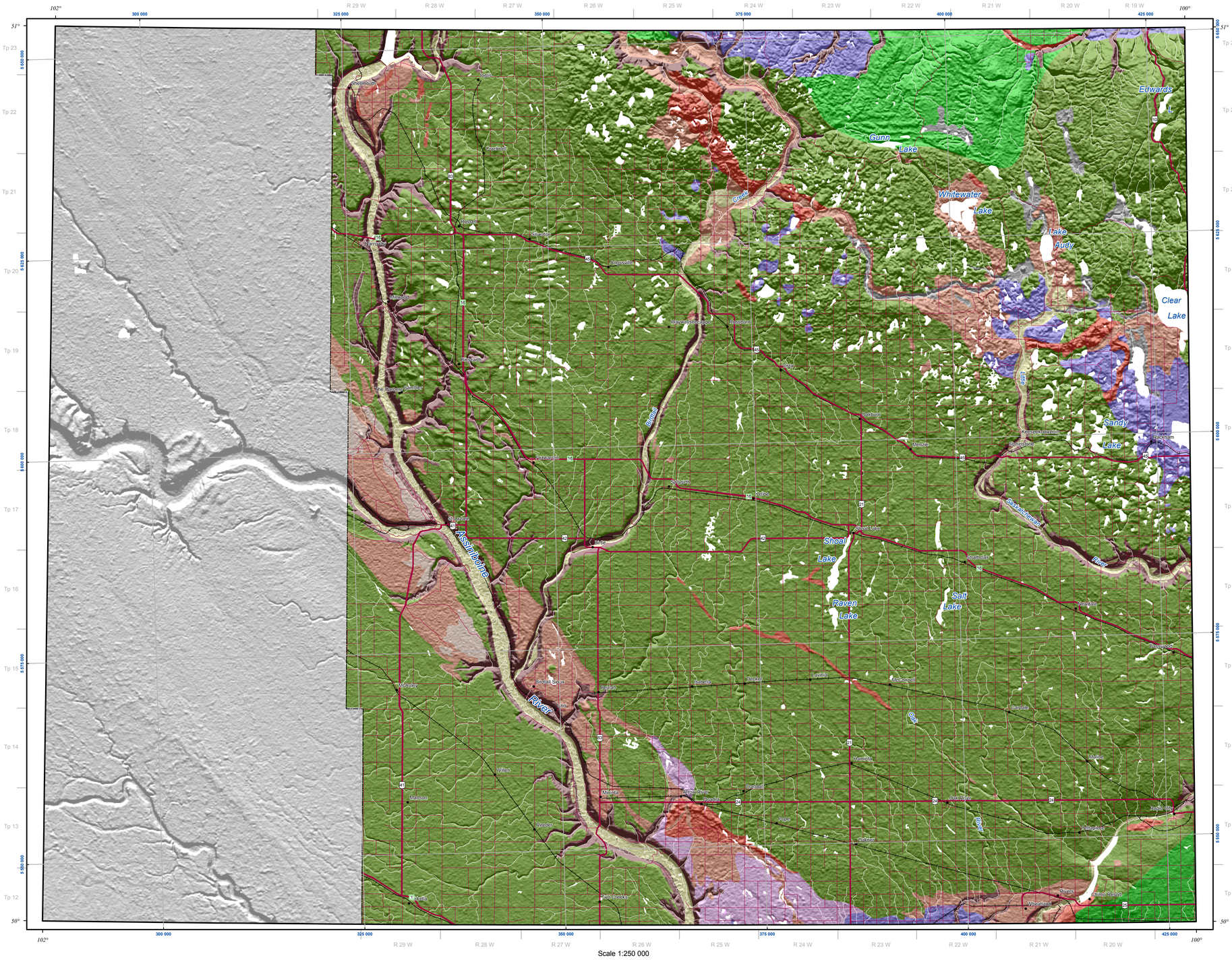


SURFICIAL GEOLOGY COMPILATION MAP SERIES

The Surficial Geology Compilation Map Series (SGCMS) addresses an increasing demand for consistent surficial geology information for applications such as groundwater protection, industrial mineral management, protected lands, basic research, mineral exploration, engineering, and environmental assessment. The SGCMS will provide province-wide coverage at scales of 1:500 000, 1:250 000 and a final compilation at 1:1 000 000.

The unit polygons were digitized from paper maps originally published by the Geological Survey of Canada and Manitoba Geological Survey (MGS). In several areas, digital polygons derived from soils mapping were used to fill gaps in the geological mapping. The 1:250 000 scale maps provide a bibliography for the original geological mapping.

Edge-matching of adjoining 1:250 000 scale map sheets is based on data from the Shuttle Radar Topography Mission Digital Elevation Model (SRTM DEM[1]) as interpreted by the MGS. Other polygon inconsistencies were modified in a similar manner. Geology (colour) is draped over a shaded topographic relief map (grey tones) derived from the SRTM DEM.

[1] United States Geological Survey 2002: Shuttle radar topography mission, digital elevation model, Manitoba; United States Geological Survey, URL <ftp://edcsgs9.cr.usgs.gov/pub/data/srtm/>, portions of files N48W88W.hgt.zip through N60W102.hgt.zip, 1.5 Mb (variable), 90 m cell, zipped hgt format [Mar 2003].

LEGEND

Quaternary

O — ORGANIC DEPOSITS: peat, muck; <1–5 m thick; very low relief wetland deposits; accumulated in fen, bog, swamp, and marsh settings

Lm — SHORELINE SEDIMENTS: sand and gravel; 1–2 m thick; beaches; formed by waves at the margins of modern lakes

C — COLLUVIUM: landslide debris, eroded slopes, sheet flood deposits associated with steep slopes

E — EOLIAN: sand and minor silt; dunes, blowouts and undulating plains; generally overlies deltaic sediments, coarse lacustrine sediments, or glaciofluvial deposits

A — ALLUVIAL SEDIMENTS: sand and gravel, sand, silt, clay, organic detritus; 1–20 m thick; channel and overbank sediments; reworked by existing rivers and deposited primarily as bars

Ls — MARGINAL GLACIOLACUSTRINE SEDIMENTS: sand and gravel; 1–20 m thick; beach ridges, spits, bars, littoral sand and gravel; formed by waves at the margin of glacial Lake Agassiz

Lc — OFFSHORE GLACIOLACUSTRINE SEDIMENTS: clay, silt, minor sand; 1–20 m thick; very low relief massive and laminated deposits; deposited from suspension in offshore, deep water of glacial Lake Agassiz; commonly scoured and homogenized by icebergs

Gs — DISTAL GLACIOFLUVIAL SEDIMENTS: fine sand, minor gravel, thin silt and clay interbeds; 1–75 m thick; subaqueous outwash fans; deposited in glacial Lake Agassiz by meltwater turbidity currents; commonly reshaped by wave erosion and reworked by wind

G — PROXIMAL GLACIOFLUVIAL SEDIMENTS: sand and gravel; 1–20 m thick; complex deposits, belts with single or multiple esker ridges and kames, as well as thin, low-relief deposits; deposited in contact with glacial ice by meltwater

TILL: diamicton; 1–75 m thick; low-relief, commonly streamlined deposits; subglacial deposits; largely derived from shale above the Manitoba Escarpment, carbonate rocks in the central lowlands, and crystalline rocks in areas of Precambrian terrane; thicker sequences consist of multiple units of varying texture; commonly scoured by icebergs; covered discontinuously by thin veneers (<1 m) of glaciolacustrine and glaciofluvial sediments

Tm — Calcareous clay diamicton, predominantly derived from Mesozoic shale

Tc — Calcareous silt diamicton, predominantly derived from Paleozoic dolomite and limestone

Tp — Non-calcareous sand diamicton, predominantly derived from Pre-cambrian crystalline rock

Pre-Quaternary

R — ROCK: > 75% bedrock outcrop; Cretaceous shales above the Manitoba Escarpment, Paleozoic carbonate-dominated rocks in areas west and south of Lake Winnipeg, exposed typically as glacially striated, low-relief surfaces; in Precambrian terrane, generally unweathered intrusive, metasedimentary, and metavolcanic rocks having a glacially scoured irregular surface with high local relief

Uncoloured legend blocks indicate units that do not appear on this map.
To aid the reader a shadow effect has been added to exaggerate the topographic relief.

Published by: Manitoba Industry, Economic Development and Mines
Manitoba Geological Survey, 2004

Compiled by: G.L.D. Matile and G.R. Keller

Modified from:
Klassen, R.W. 1978. Surficial geology of Riding Mountain, west of principle meridian Manitoba-Saskatchewan; Geological Survey of Canada, "A" Series Map, Map 1479A, 1 map. Scale 1:250 000.

Geology polygons in the Riding Mountain National Park area are based on data from the Shuttle Radar Topography Mission Digital Elevation Model as interpreted by the MGS.

A brief description of the Quaternary landscape of southern Manitoba

Eastward-facing bedrock escarpments culminating in cuestas which form the Manitoba Escarpment provide a foundation for the present-day landscape of southern Manitoba. To the east, the landscape is dominated by Precambrian rocks and bedrock structure, such as faulting, is commonly visible.

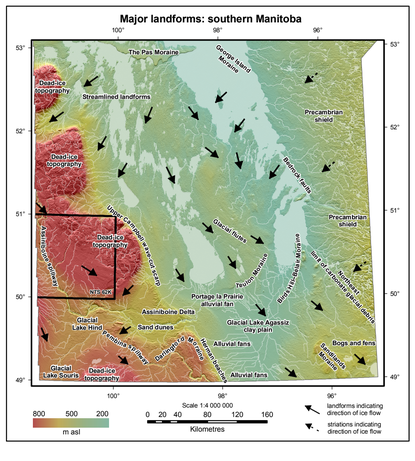
Above the Manitoba Escarpment, the landscape is dominated by hummocky moraine or dead-ice topography, streamlined topography and glacial spillways. Many areas are covered by thick sequences of glacial till representing numerous glacial episodes dating back more than 100,000 years. The most recent glacial advances were from the northwest. Glacial till tends to be clay rich.

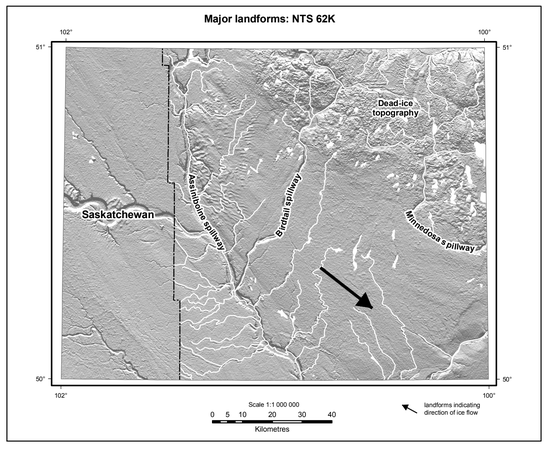
The Interlake is dominated by streamlined landforms and in lower areas, glaciolacustrine depositional basins. Quaternary sediments tend to be relatively thin and the preservation of older sediments is uncommon, limited to bedrock protected areas such as escarpments. Bedrock outcrops are common. Glacial advance was generally from the northwest, parallel to the streamlined landforms. Glacial till is typically silt rich. Glacial retreat occurred in a series of steps marked by moraines: the Darlingford Moraine (~11,000 years old); the Sandilands Moraine, which represents the interlobate position of the Rainy lobe from the northeast and the Red River lobe from the northwest; the Birds Hill–Belair Moraine; the Teulon Moraine; and The Pas Moraine (~9000 years old). George Island Moraine, contemporaneous with and to the east of The Pas Moraine, is another ice margin of the retreating Rainy lobe.

In the Precambrian shield, rock outcrops dominate the landscape. Quaternary sediments are commonly thick, but discontinuous, rarely completely infilling the bedrock lows. Older sediments, including saprolites, are often preserved in the bedrock lows where they are protected from glacial erosion. Glacial advance was generally from the northeast. Glacial till is typically sand rich.

As the glaciers retreated, glacial lakes Souris and Hind formed and drained, and glacial Lake Agassiz expanded northward, progressively covering the entire area below the Manitoba Escarpment. Major Lake Agassiz landforms include the Assiniboine Delta, which formed as glacial meltwater flowed from the Assiniboine spillway, and clay plains composed of tens of metres of clay and silt. The Herman beaches indicate the highest level attained by Lake Agassiz in southern Manitoba. The Upper Campbell beach is the best developed of the Lake Agassiz beaches and is evident along the base of the Manitoba Escarpment.

Holocene modifications to the landscape include eolian activity (sand dunes) primarily in the Assiniboine Delta and the Sandilands Moraine; the Portage la Prairie alluvial fan, from which fluctuating Assiniboine River flow directions over the last 7000 years have been documented; smaller alluvial fans that have developed along the Manitoba Escarpment; large landslide areas (colluvium) that are active along the northern part of the Manitoba Escarpment; and organic accumulations (bogs and fens) with basal radiocarbon dates of approximately 6000 years, that occur in the northeast and extend westward into the northern and eastern Interlake and southward into southeastern Manitoba.

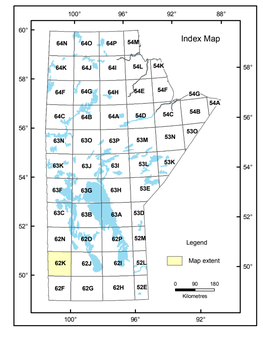




SURFICIAL GEOLOGY COMPILATION MAP SERIES

SG-62K

Surficial geology of the Riding Mountain map sheet (NTS 62K), Manitoba



North American Datum 1983
Universal Transverse Mercator Projection, Zone 14
Shuttle Radar Topography Mission elevation data provided by NASA (2003)
100X Vertical Exaggeration
Approximate mean declination (2004) for centre of map is 8°18' E, decreasing 7.4' annually.

Copies of this map can be obtained from:
Manitoba Industry, Economic Development and Mines
Manitoba Geological Survey, Publication Sales
360-1395 Ellice Ave
Winnipeg, MB, R3G 3P2
Canada

Phone: (204) 945-4154
Toll free: 1-800-223-5215
E-mail: minesinfo@gov.mb.ca
This map is available to download free of charge at
www.gov.mb.ca/itm/mrd

Suggested reference:
Matile, G.L.D. and Keller, G.R. 2004: Surficial geology of the Riding Mountain map sheet (NTS 62K), Manitoba; Manitoba Industry, Economic Development and Mines, Manitoba Geological Survey, Surficial Geology Compilation Map Series, SG-62K, scale 1:250 000.

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