

# SURFICIAL GEOLOGY MAP OF SASKATCHEWAN

Scale 1:1 000 000  
Kilometres 0 10 20 30 40 50 60 70 80 Kilometres  
Miles 0 10 20 30 40 50 Miles

## GEOLOGICAL LEGEND

**ORGANIC DEPOSITS:** Accumulations of decomposed and undecomposed vegetation in saturated or poorly drained areas; present in bogs, fens, swamps, and marshes

Op Organic plain

**ALLUVIAL DEPOSITS:** Gravel, sand, silt, clay, and slump material on floodplains and terraces of modern streams

Ap Alluvial plain

**EOLIAN DEPOSITS:** Fine- and medium-grained sand and silt reworked by wind to form undulating and rolling topography

Ep Eolian plain

Er Eolian ridged

Eh Eolian hummocky

**GLACIOFLUVIAL (AND FLUVIAL) DEPOSITS:** Gravel, sand, and silt accumulations transported and deposited by glacial meltwater

GfP Glaciofluvial plain

GfT Glaciofluvial terrace

GfH Glaciofluvial hummocky

GfE Glaciofluvial eroded

**GLACIOLACUSTRINE DEPOSITS:** Sand, silt, and clay accumulations deposited in glacial lakes

GLP Glaciolacustrine plain

GLD Glaciolacustrine delta

**GLACIAL DEPOSITS:** Till consisting of unsorted mixtures of boulders, gravel, sand, silt, and clay, deposited from glacial ice during periods of advance, retreat, and stagnation

Mp Moraine plain

Md Moraine drumlinoid

Mv Moraine veneer

Me Moraine eroded

Mu Moraine undulating

Mr Moraine ridged

Mh Moraine hummocky

**BEDROCK:** Precambrian outcrops of acid and basic crystalline rocks throughout the northern third of the province (Canadian Shield); Phanerozoic outcrops of limestone, dolomite, shale, mudstone, sandstone, and conglomerate in the south

R Bedrock

## SYMBOLS

- Drumlin/fluting
- Striations (ice flow direction indicators)
- Ridged moraine (ridges perpendicular to ice flow)
- Esker
- Beach ridges (strandlines)
- Meltwater channel (major)
- Meltwater channel (minor)
- Sand dunes

## NOTES

Surficial sediments cover almost the whole of the province, an area of 650,000 square kilometres. Units are differentiated on the basis of the deposit type followed by a geomorphic modifier (e.g. Mp - Moraine plain, GfH - Glaciofluvial hummocky) and are generally simplified to indicate the predominant surficial deposit in each area.

The present surficial deposits and landforms are largely the result of erosion and deposition during the most recent glacial period, the Wisconsinan. Deposits formed by earlier Quaternary events have been extensively eroded, overlain, and reworked by subsequent glacial and glaciofluvial events. A map of the retreat of the most recent glacial limit (Wisconsinan) indicates the generalized ice-marginal positions of the ice front during deglaciation of the province. More recent deposits characteristically overlie older deposits, except in areas of ice-push truncation, where blocks of older material are emplaced on top of younger deposits (e.g. in the DRI Hills area of south-central Saskatchewan).

All sediments between bedrock and the present land surface are collectively referred to as "drift". They range from 0 to 300 m in thickness. A map of drift thickness, derived from thousands of test holes located mainly in the southern half of Saskatchewan, shows the greatest drift thickness with a north-west-trending band across the southern part of the province.

Physiographically, the province slopes northwards with elevations reaching up to 1450 m in the Cypress Hills (located in the southwest) and down to 200 m near Lake Athabasca in the northwest. The downslope recession of the ice sheet markedly contributed to the province's present geomorphology.

## SURFICIAL GEOLOGY DEPOSITS

Organic deposits (including swamps, bogs, fens, and peats) are made up of accumulations of decomposed and partially decomposed vegetation. They occur mostly in poorly drained areas in the central and northern parts of the province.

Alluvial deposits are the result of modern fluvial processes. These deposits include sediments laid down on floodplains along river valleys, and on the floors of glacial valleys and channels. Significant alluvial deposits are located along the North and South Saskatchewan rivers and the Qu'Appelle valley.

Eolian deposits, represented by bare plains and dune fields, were formed in the immediate post-glacial period following the drainage of glacial lakes and before the establishment of vegetation. Dune deposits, from 1 to 30 m in thickness, typically occur as arcuate and orthogonal landforms in the Athabasca field, whereas, in the Great Sand Hills field in southwest Saskatchewan, the dunes are primarily parabolic.

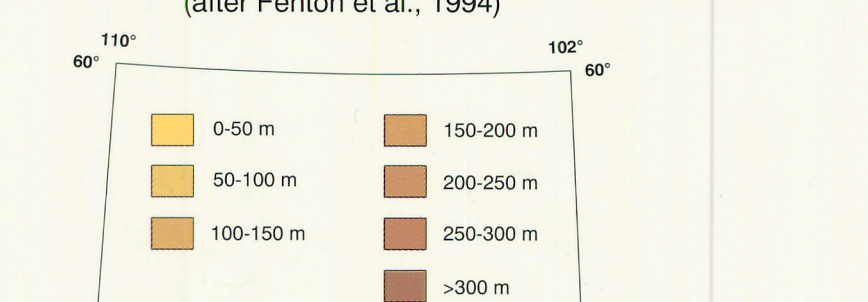
Glaciofluvial deposits, including silt, sand, and gravel, were deposited by meltwater from the retreating ice sheet, both below and in front of the glacial ice. Ice contact deposits include eskers and kames, whereas, outwash deposits were laid down beyond the ice margin.

Glaciolacustrine deposits, which form broad, low-relief plains, consist of fine-grained sediments, comprising mostly silt and clay, deposited in lakes formed along the ice margin. Meltwater and detrital material drained eastward along the ice margin from lake to lake through hollows which cut along valleys (e.g. the Qu'Appelle valley) in drift and bedrock. Glaciolacustrine deltaic deposits formed where rivers entered lacustrine basins. As the glacier continued to retreat to the northeast, lake elevations fell and successively lower deltas were built in glacial Lake Saskatchewan by the North and South Saskatchewan rivers.

Glacial deposits, the most extensive surficial material, consist predominantly of till, an unsorted mixture of clay, silt, sand, cobbles, and boulders deposited directly by the glacial ice. They are subdivided by morphology (e.g. plain, drumlinoid, hummocky, etc.) which also reflects the differences in mode of deposition. Till deposited at the base of an advancing glacier results in low-relief moraine plains. In some locations, these plains have elevated features which reflect the direction of ice movement (stratons, flutings, and drumlins). When till is deposited at the terminus of retreating glacial ice it forms large mounds and ridges called moraines. Till deposited by the melting of stagnant ice results in the deposition of hummocky moraines.

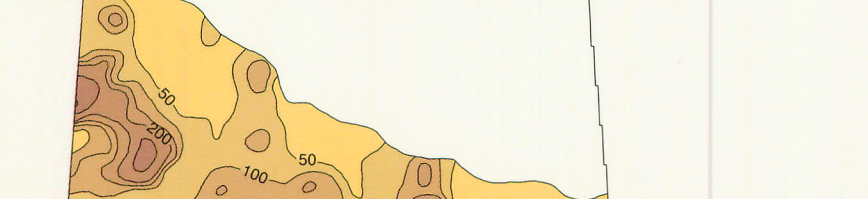
Bedrock or "outcrop" is exposed at surface where Quaternary sediments are absent. Precambrian outcrops of the Canadian Shield are found throughout the northern third of the province. Outcrops of Phanerozoic bedrock south of the Canadian Shield are far less evident due to the deposition of extensive, thick drift cover. Significant outcrops of Tertiary and Cretaceous aged material are common, however, in the extreme south and southwest parts of Saskatchewan (i.e. Cypress Hills Formation and Ravenswing Formation) where areas escaped glaciation by virtue of the high elevation.

## SURFACE TO BEDROCK ISOPACH - DRIFT THICKNESS



## ICE MARGIN POSITIONS DURING THE WISCONSINAN DEGLACIATION

(in years before present (after Schreiner, 1979 and Schreiner, 1983))



## CREDITS AND ACKNOWLEDGMENTS

Geology compiled by M.A. Simpson, Environment Branch, Saskatchewan Research Council, from surficial geology maps at 1:250 000 scale by J.E. Campbell and M.A. Simpson and 1:1 000 000 scale by B.T. Schreiner.  
Original digital topographic base map from Central Survey and Mapping Agency, Regina, Saskatchewan. Preliminary drafts scanned and vectorized by Triggs Rogers, Saskatchewan Survey Data Centre, Regina, Saskatchewan. SGP 6/14 (D86) 787-2528 FAX (D86) 787-2527  
Printed November 1997 by Duf Printers, Winnipeg, Manitoba.  
Copies of this map may be obtained through:  
Saskatchewan Energy and Mines  
Communications Branch  
11 Innovation Boulevard  
Saskatoon, Saskatchewan S7N 2Z8  
(306) 953-5400 FAX (306) 953-7446  
and  
Saskatchewan Research Council  
Information Centre  
11 Innovation Boulevard  
Saskatoon, Saskatchewan S7N 2Z8  
(306) 953-5400 FAX (306) 953-7446  
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This map may be referenced as:  
Simpson, M.A. (compiler) (1997). Surficial geology map of Saskatchewan. Sask. Energy Mines/Reg. Environ. Coun., 1:1 000 000 scale.  
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