Nova Scotia Department of Natural Resources
Geoscience and Mines Branch

Open File Map ME 2018-002

Preliminary Surficial Geology Map of the Eastern Cobequid Highlands, Nova Scotia

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Scale 1:35 000

1 0 1 2 3 km

Halifax, Nova Scotia
2018

Descriptive Text

This map depicts the distribution and characteristics of Quaternary glacial and other surficial deposits in the eastern Cobequid Highlands of northern mainland Nova Scotia. The surficial geology has been shaped by extensive glacial modifications throughout the last Wisconsinan glaciation, with ice-flow centres shifting from external ice centres to multiple ice centres on the province itself (Stea, 1992; Stea et al., 2011). Previous mapping by Stea and Finck (1988) and Stea et al. (1985) identified regions of complex ice-flow chronologies, with four ice-flow phases over northern mainland Nova Scotia, and a multitude of surficial deposit types throughout the region. Understanding this glacial history, including past ice-flow trajectories, their associated landforms, bedrock erosion, glacial sediment transport and deposition, is vital for successful drift prospecting in the region.

The oldest documented Wisconsinan ice-flow phase in the region was eastward and then southeastward, originating from a centre outside the province. Evidence for this ice-flow phase is widespread over the province and includes striations, distinctive erratics, till fabrics, and striated boulder pavements.

The second ice-flow phase was southward and southwestward from the Escuminac Ice Centre in the Prince Edward Island region. This phase is recorded by southward-trending striations crossing earlier southeastward-trending striations at many sites on the upland regions of Nova Scotia and New Brunswick. This ice-flow phase was responsible for the deposition of a distinctive reddish-brown hybrid till throughout the northern areas of the province, from mainland Nova Scotia and Carboniferous basins in the Prince Edward Island region. This hybrid till is the surface till over much of the study area. This phase is also responsible for most of the depositional landforms (drumlins) and erosional indicators (striations) in the study area.

The third ice-flow phase was characterized by an ice divide (Scotian Ice Divide) situated over most of the province, resulting in northerly ice flow in northern mainland Nova Scotia and south to southeastward ice flow in southern Nova Scotia. Within the study area, this ice-flow phase is associated with a mostly locally derived, stony, grayish-brown, hybrid till. Erratics from the Cobequid Highlands have been found throughout the Carboniferous lowlands to the north. Northward-trending striations can be traced across the northern mainland of Nova Scotia.

The last phase of ice flow included the re-advance of remnant ice centres developed from the Scotian Divide. Ice flow during this phase was strongly funneled westward into the marine basins. Erosional features and depositional landforms relating to these late-glacial ice centres are restricted to low-lying areas and are not present within the study area.

Disclaimer

The information on this map may have come from a variety of government and nongovernment sources. The Nova Scotia Department of Natural Resources does not assume any liability for errors that may occur. This map is intended for use at the published scale of 1:35 000.

This publication is preliminary and has received only limited peer review.

Map Notes

GIS databases, cartography and reproduction by Angie Barras of the Nova Scotia Department of Natural Resources, Geoscience Information Services Section, 2018. The GIS databases and map were developed using ArcGIS® 10.5.

Universal Transverse Mercator Projection (UTM), Zone 20, Central Meridian 63°00' West. North American Datum (NAD) 1983 Canadian Spatial Reference System (CSRS) 98.

Base and digital data derived from the Nova Scotia Topographic Database (NSTDB). Copyright Her Majesty the Queen in Right of the Province of Nova Scotia. The NSTDB is available from the Department of Internal Services, Nova Scotia Geomatics Centre (NSGC), Amherst, Nova Scotia.

Shaded relief image derived from 1 m LiDAR bare-earth digital elevation data merged from parts of a Cobequid Highlands survey acquired in December 2010 and a Colchester County survey acquired in June and July of 2013. The data were merged by NSDNR in February 2018 (DP ME 507). Azimuth of 0°, sun angle of 45° and a vertical exaggeration of 5.

Geology conforms to GSC Surficial Data Model 2.3.0

Selected References

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Stea, R.R., Finck, P.W., and Wightman, D.M., 1985. Quaternary geology and till geochemistry of the western part of Cumberland County, Nova Scotia (sheet 9); Geological Survey of Canada, Paper 85-17, 58 p.

Stea, R.R. and Finck, P.W., 1988. Surficial geology map of parts of Colchester, Cumberland, Pictou and Hants counties, Nova Scotia (sheets 10 and 11); Nova Scotia Department of Mines and Energy, Map 88-13, scale 1:100 000.

Stea, R.R. and Mott, R.J., 1990. Quaternary Geology of Nova Scotia: Guidebook for Field Excursion: 53rd Annual Reunion, Friends of the Pleistocene, Halifax, Nova Scotia, May 25-28, 1990, 85 p.

Stea R. R., Conley, H., and Brown, Y. (compilers), 1992. Surficial geology of the Province of Nova Scotia; Nova Scotia Department of Natural Resources, Map 92-1, scale 1:500 000.

Stea, R.R., Seaman, A.A., Pronk, T., Parkhill, M.A., Allard, S., and Utting, D., 2011. The Appalachian Glacier Complex in Maritime Canada; in Development in Quaternary Science, v.15, eds. J. Ehlers, P.L. Gibbard, and P.D. Hughes; Amsterdam, The Netherlands, p. 631-659.

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LEGEND

QUATERNARY

HOLOCENE (POSTGLACIAL)

ORGANIC DEPOSITS, UNDIFFERENTIATED (**O**): undifferentiated bog and fen deposits developed in areas of poor drainage, generally greater than 1 m thick.

ALLUVIAL SEDIMENTS, UNDIFFERENTIATED (**A**): gravel, sand, silt, minor clay, and organic material; deposited by active streams and rivers; forms floodplains, channel, and bank deposits, thickness estimated 2-10 m.

COLLUVIAL SEDIMENTS, UNDIFFERENTIATED (**C**): gravel, sand, silt, minor clay, and organic material; a mixture of glacial deposits, weathered and frost-shattered rock formed by periods of downslope creep and/or mass movement along steep valley walls; thickness estimated 1-10 m.

PLEISTOCENE (LAST GLACIATION - LATE WISCONSINAN)

GLACIOFLUVIAL SEDIMENTS: sand, gravel, with minor silt; well to poorly sorted, massive to stratified; sediments deposited by glacial meltwater from, or in contact with, glacial ice in a subglacial, subaqueous, or proglacial environment; forms outwash plains, deltas, kames, kame terraces, and eskers; thickness estimated 3-30 m.

GLACIOFLUVIAL SEDIMENTS, UNDIFFERENTIATED (**GF**): sand, gravel, with minor silt and diamicton; well to poorly sorted, massive to stratified; thickness estimated 3-30 m.

GLACIOFLUVIAL SEDIMENTS, KAME TERRACES AND ESKER SYSTEMS (**GFk**): sand, with minor silt and diamicton; poorly to well bedded; forms steep-sided mounds or hummocks (kames), terraces on valley sides (kame terraces) and sinuous steep-sided esker ridges; deposited by glacial meltwater streams depositing sediments in holes in ice (kames), between glacier and valley slopes (kame terrace), in water (kame delta) and tunnels in ice (eskers); thickness estimated 4-20 m (kames), 3-30 m (kame terraces), and 5-10 m (eskers).

GLACIOFLUVIAL SEDIMENTS, OUTWASH PLAINS AND DELTAS (**GFp**): gravel, sand and minor silt; massive to horizontally stratified; forms outwash plains and topsets of Gilbert-style deltas; thickness estimated 3-30 m.

GLACIAL SEDIMENTS (TILL): reddish-brown to grayish-brown silty to sandy diamicton derived from local and distant sources; loose to compact; bouldery near surface; clast content ranges from 10 to 40%, striated and faceted clasts of varied lithologies; sediments derived from actively flowing ice, subglacial erosion, and melt-out processes; thickness estimated <1-30 m.

GLACIAL SEDIMENTS, TILL VENEER (**Tv**): stony, silty sand diamicton; forms a discontinuous cover over bedrock and interspersed with small bedrock outcrops; mostly angular clasts; clast lithology > 90% local bedrock; geomorphology generally resembles the underlying bedrock structure; thickness estimated <1-2 m.

GLACIAL SEDIMENTS, STREAMLINED TILL (**Ts**): silty to silty-sand diamicton; higher percentage of distally sourced material deposited by ice sheets centred outside of Nova Scotia; deposited by actively flowing ice, associated with larger oriented landforms, geomorphology includes drumlinoid features, fluted terrain, and crag-and-tail forms.

GLACIAL SEDIMENTS, HUMMOCKY TILL (**Th**): silty sand to sandy diamicton; loose, inclusions of waterlain sediment; irregular surface topography marked by small mounds of till deposits, sediments derived from subglacial erosion, and melt-out processes; these deposits may represent areas occupied by stagnant ice; thickness estimated 1-10 m.

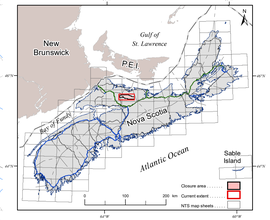
GLACIAL SEDIMENTS, TILL BLANKET (**Tb**): silty sand diamicton; forms continuous cover that masks underlying bedrock topography and structure; thickness estimated >2-20 m.

PRE-PLEISTOCENE

BEDROCK (**R**): glacially scoured bedrock of various types and ages; overlain by thin, discontinuous veneer of till, shaped by glacial erosion.

Symbols

- Station location
- Drumlin
- Roche Moutonnee (ice flow direction known)
- Glacial Striation (direction known, unknown)
- Geological contact
- Ice flow (direction unknown)
- Esker
- Arterial highway
- Collector highway
- Local road
- Seasonal, restricted or private road
- Trail, track
- Railway (active)
- River, stream
- Boundary (county)
- Transmission line
- Wetlands
- Dam
- Lake



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Feb 27, 2018