Bedrock Topography of the Greater Toronto and

Oak Ridges Moraine areas, southern Ontario

Text modified from original hardcopy map release:

Brennand, T. A., Moore, A., Logan, C., Kenny, F. M., Russell, H. A. J., Sharpe, D. R., and Barnett, P. J., 1998, Bedrock Topography of the Greater Toronto and Oak Ridges Moraine areas, southern Ontario: Geological Survey of Canada, scale 1: 200 000, Open File 3419.

Past Work

The configuration of the bedrock surface in the GTA (Fig. 1) has been of interest since the early reports of Spencer (e.g. 1881) who drew attention to the location of a former channel network connecting Georgian Bay and Lake Ontario. More recently the location of bedrock valleys has been of interest due to their hydrogeological significance and possible control on regional groundwater flow (e.g. Haefeli, 1970). A series of bedrock topography maps have been produced as part of geological mapping in the area (e.g. Karrow, 1967) and these data were used to re-assess the location of the Laurentian channel (e.g. White and Karrow, 1971). The regional Ministry of Environment (MOE) water well records were used to map the bedrock surface (Eyles et al., 1993).

Current Data Assembly

The present map is a synthesis of a wider range of subsurface records from government agencies (e.g. MOE), geotechnical consulting firms, utilities, local government, most geological mapping records and new and archival geophysical data (Table 1). The orginal point data have been verified for location errors (e.g. Kenny et al.,1996; Kenny and et al., 1997), standardized coding of subsurface lithologies (e.g. Brennand et al., 1997; Russell et al., 1996), and error trapping procedures (Logan, unpublished). The final data sets used to produce the map are shown (Figs.2&3) as is a contoured version of the map (Fig.4) and selected cross-sections (Fig.5). These data sets were processed using a TIN model in ARCINFO® to derive the most reasonable interpolation of the bedrock surface (e.g. Skinner and Moore, 1997; Moore et al, 1997). Map production and layout were completed in MapInfo® and Vertical Mapper®. Preliminary versions of this bedrock surface are shown as thematic maps on a new series of surficial geology maps released as open files (cf. Fig.1).

Preliminary Results

The bedrock surface map of the GTA and surrounding area is shown with little data interpretation. Briefly, however, there are several points to note. (1) The bedrock surface has a regional southward slope from the mapped Paleozoic outcrop north of the study area. (2) There is sparse data coverage (Figs.2&3) in the thick sediment-covered areas of the Oak Ridges Moraine and Laurentian Channel, a bedrock-surface low extending from Georgian Bay to Lake Ontario (Fig.4). Despite this, it seems reasonable to conclude that: (i) no east-west bedrock ridge exists beneath the Oak Ridges Moraine, contrary to Eyles et al. (1993), and (ii) the Laurentian Channel coincides with a broad area of erodible shale bedrock (Fig.6&7). (3) Whereas in some areas there is general correspondence between bedrock valleys and modern rivers (e.g. lower Humber and Holland rivers) this does not always follow

(e.g., Oshawa Creek, Brennand in press); the pattern of modern stream courses needs more rigorous assessment (Cheng et al., 1997). (4) The Niagara Escarpment is well delineated in the west (Fig.4).

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Table 1: Principal sources of data used for development of the bedrock topographic surface DEM.

Data Sources

Agency	Bedrock Points	Pushdown Points
Ministry of Environment - Water Wells	11235	3225
UGAIS (GSC & OGS)	4128	2852
Ontario Geological Survey (Field Point)	982	137
Ministry of Transportation Ontario	418	234
Geolgical Survey of Canada (Field Point)	243	69
Interium Waste Authority	41	6
Consumers Gas	36	18
Ministry of Natural Resources	30	4
Ministry of Environment	28	2
Low Level Radioactive Waste Management Org.	15	25
Independent Consultant	9	8
Eldorado	6	2
Regional Municipality of Simcoe	5	0
Siting Task Force Secretariat	4	2
Geological Survey of Canada (Borehole)	4	1
Regional Municipality of Durham	3	0
Regional Municipality of Peel	2	0
Regional Municipality of North Humber	1	0
Regional Municipality of York	1	0
Ontario Geological Survey (Borehole)	1	1
University of Guelph	0	6
Totals	17192	6592

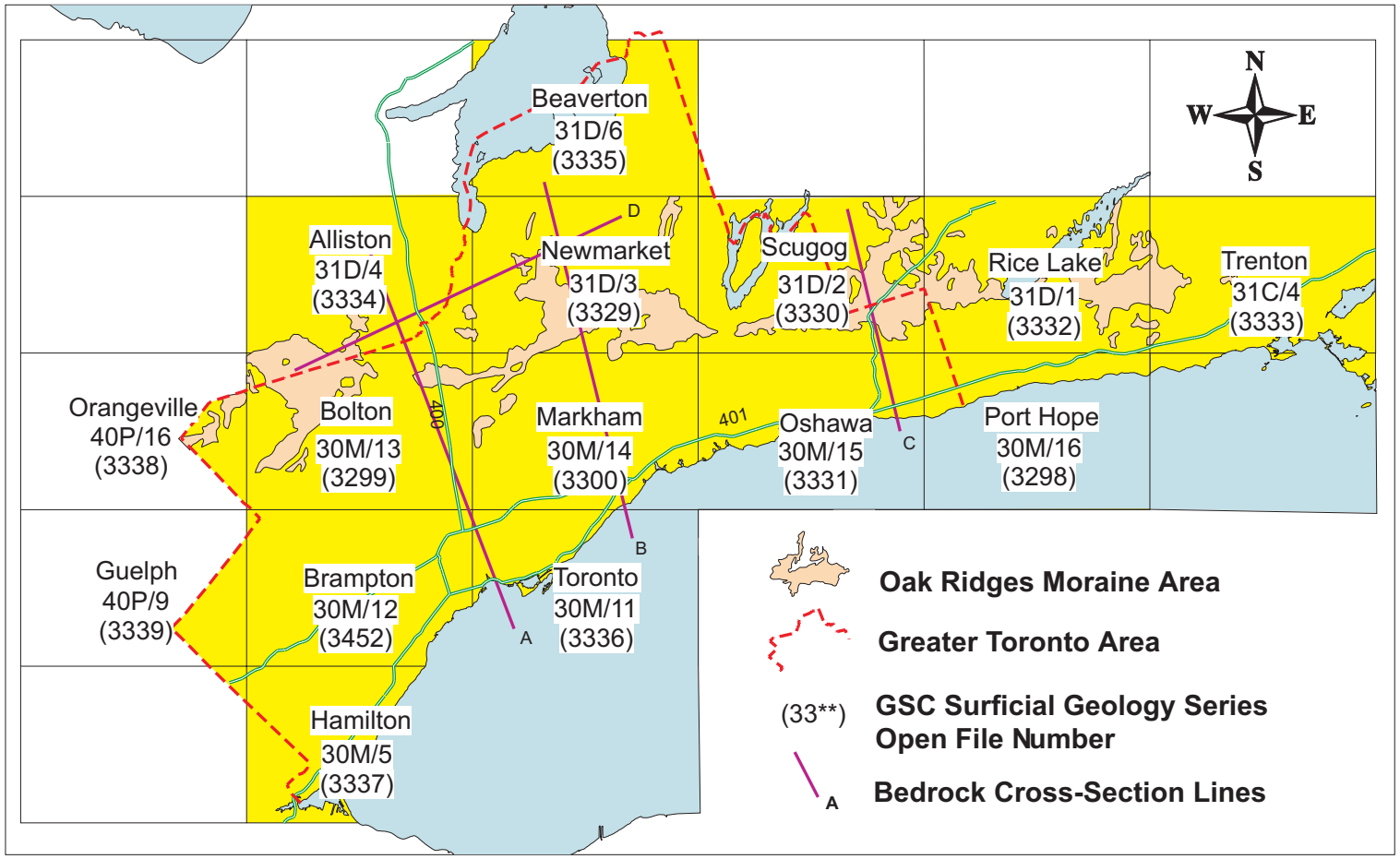

Figure 1: Location of NTS map sheets and bedrock topographic cross-sections

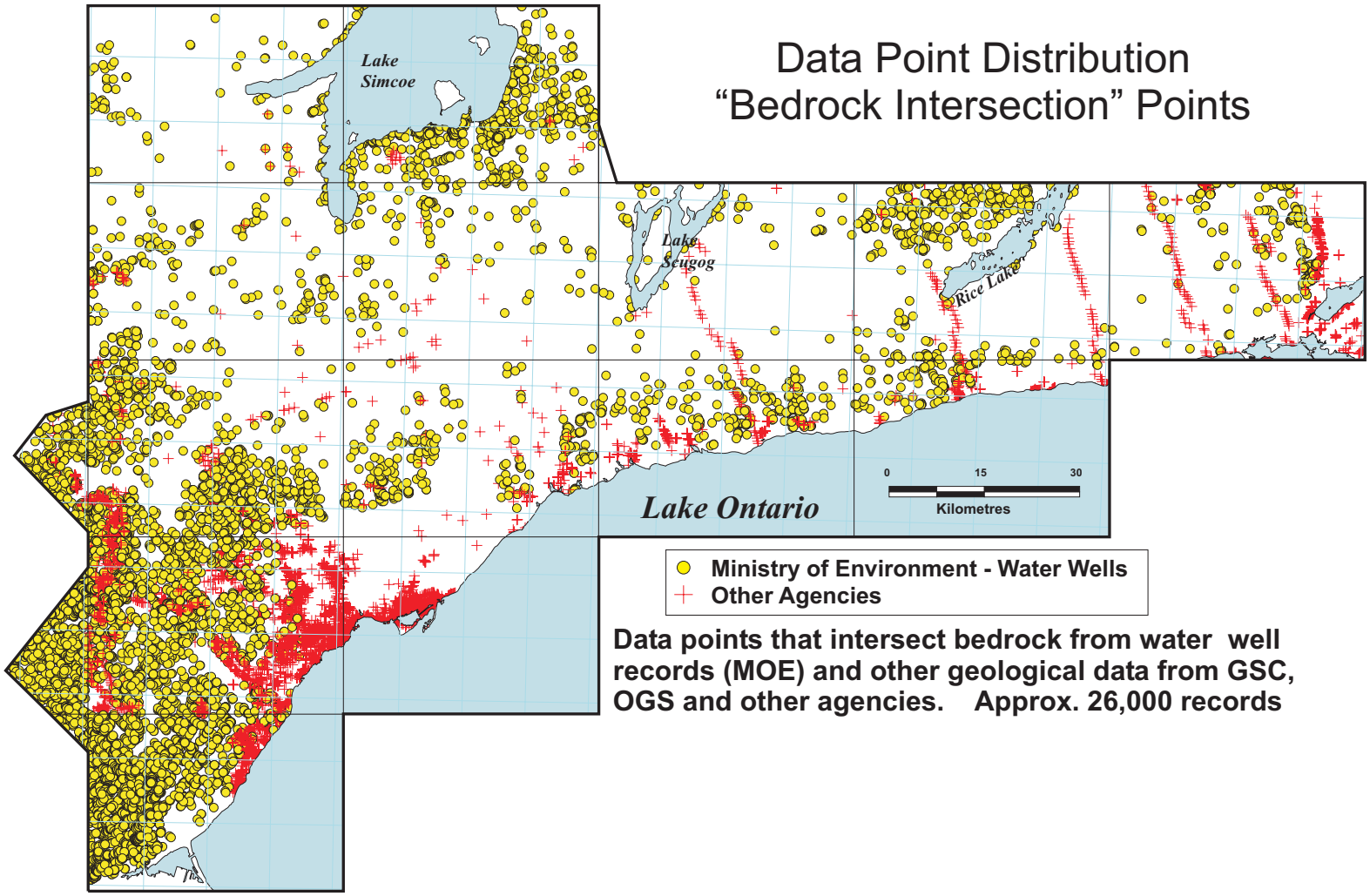

Figure 2: Data points that intersect bedrock. Note large areas with low data density

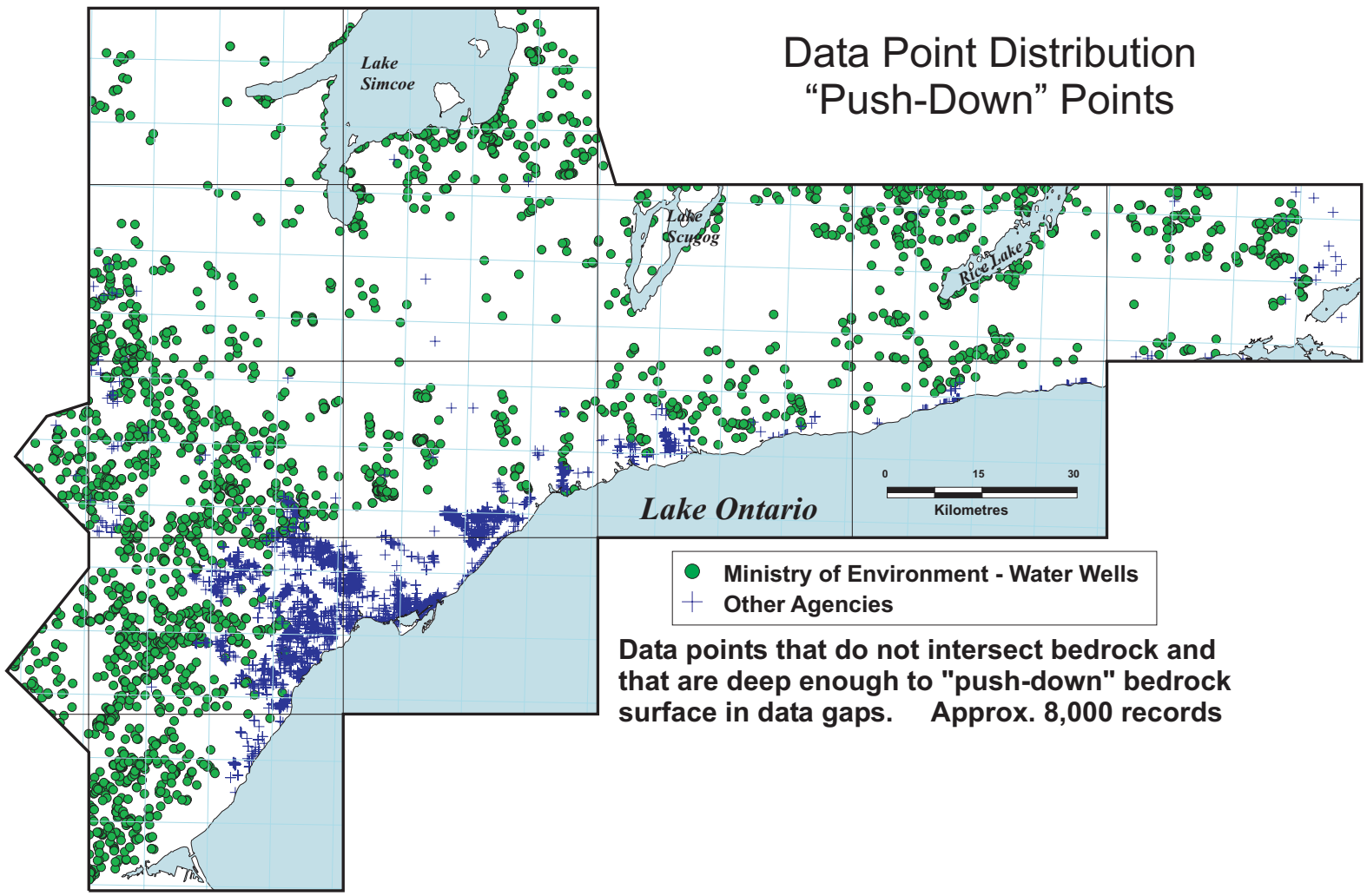

Figure 3: Data points used to push down the initial bedrock surface.

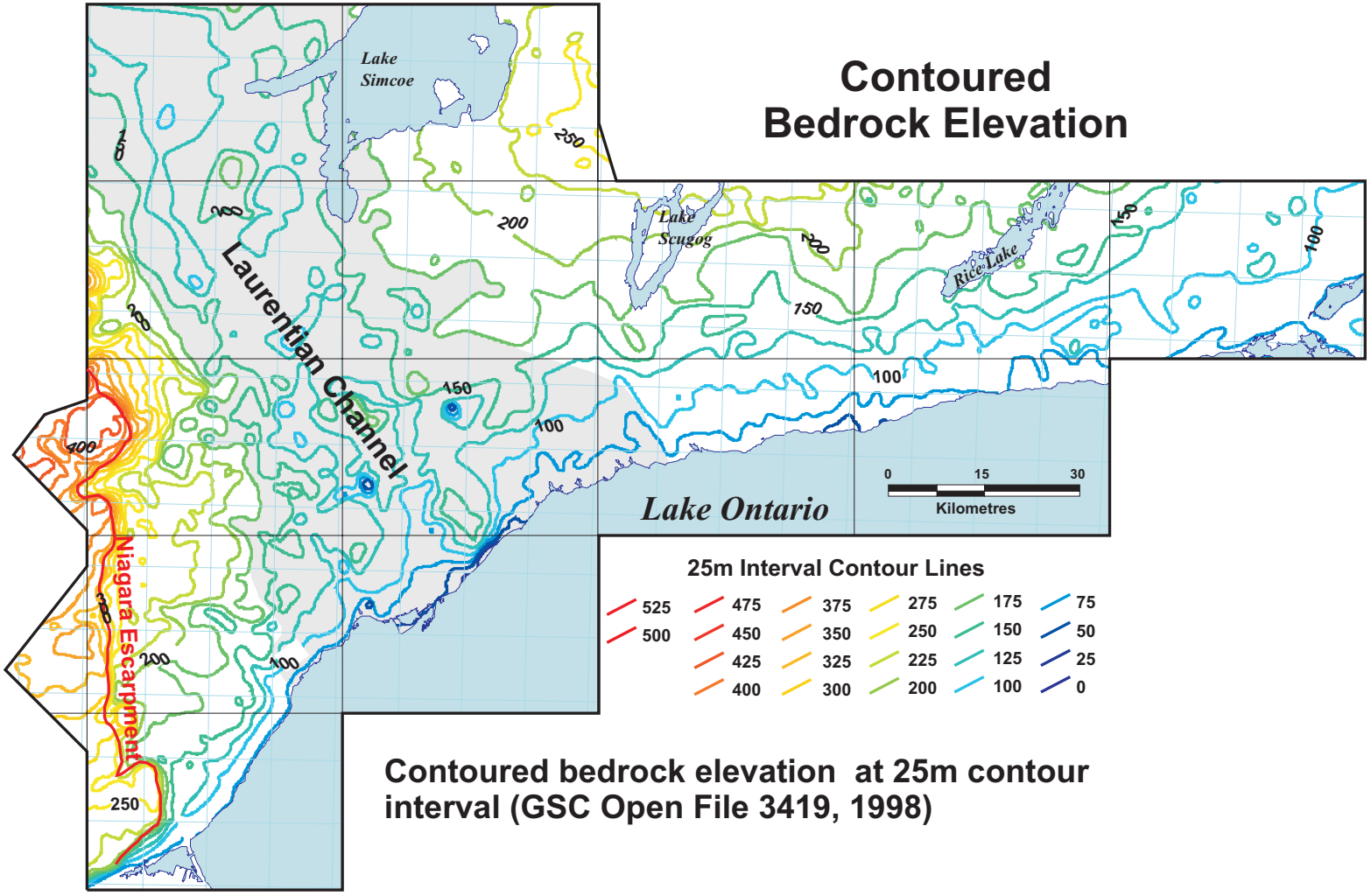

Figure 4: Bedrock topographic elevation contours

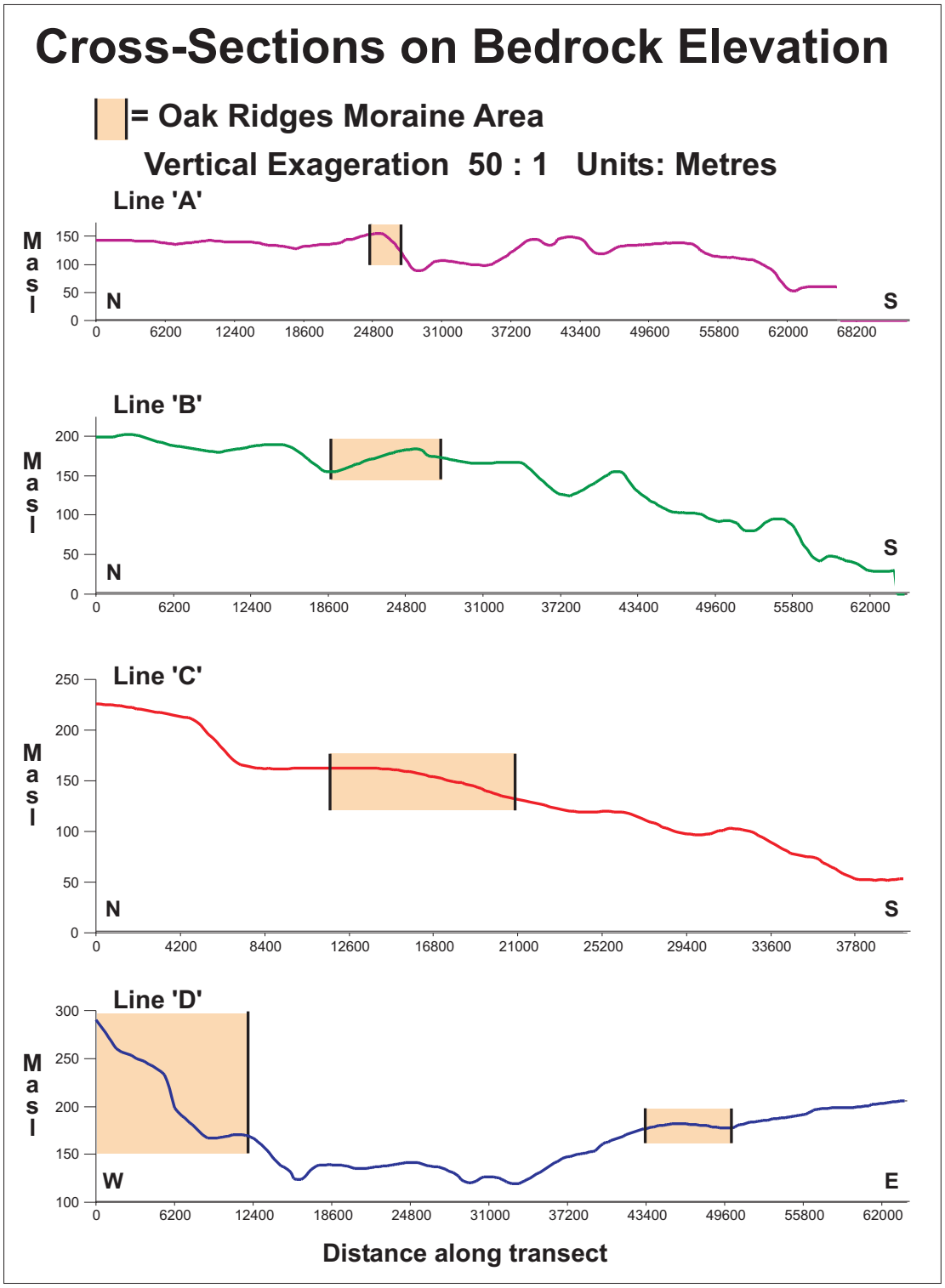

Figure 5: Cross-sections illustrating the bedrock topography. For cross-section locations refer to Figure 1.

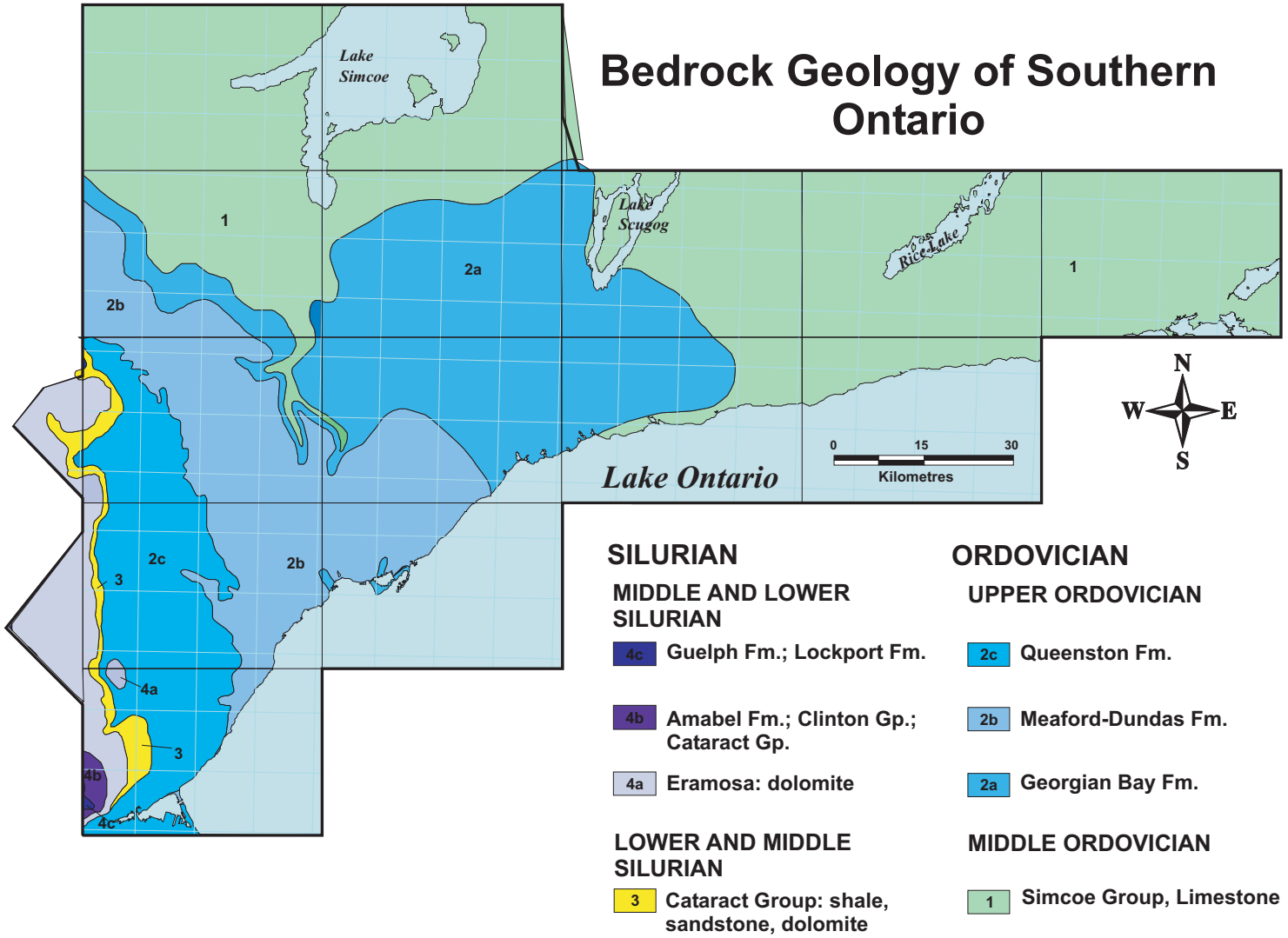

Figure 6: Paleozoic bedrock geology of southern Ontario (from Sanford and Baer. 1981).