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Paleozoic Geology of Southern Ontario

By
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Southern Ontario

By

D. F. Hewitt[1]

INTRODUCTION

The accompanying map indicates the Paleozoic geology of southern Ontario by formation or group, and outlines the extent of the exposed Precambrian rocks. Bedrock industrial mineral producers in the Paleozoic rocks of southern Ontario are also shown. In 1969, industrial mineral production in Ontario amounted to $214,966,975 of which over 70 percent, or about $151,000,000 came from the Paleozoic rocks in southern Ontario. This industrial mineral production includes gypsum, salt, limestone, shale, sandstone, lime, and portland cement. In 1969, oil and gas production in southern Ontario from the Paleozoic rocks amounted to $7,392,183.

Several changes in stratigraphic nomenclature have been made since the publication of the last edition of this map (Map 2117) in 1966, and these changes have been incorporated in the legend shown on the map (Map 2254, back pocket).

PALEOZOIC GEOLOGY

The Paleozoic rocks of southern Ontario are divided geographically into two parts by the Precambrian rocks of the Frontenac Axis that extend across the St. Lawrence River between Gananoque and Brockville. The Paleozoic area to the east of the Frontenac Axis is called the Ottawa-St. Lawrence Basin. The Paleozoic area to the west of the Frontenac Axis is here referred to as central and southwestern Ontario.

OTTAWA-ST. LAWRENCE BASIN

The Ottawa-St. Lawrence Basin is occupied by Cambrian sandstone and Ordovician dolomite, limestone, sandstone, and shale. The geology of the area has been described by Wilson (1946).

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Cambro-Ordovician

Potsdam or Nepean Formation

The Potsdam or Nepean Sandstone of Cambro-Ordovician age outcrops along the western margins of the Ottawa-St. Lawrence Basin, and rests unconformably on the underlying Precambrian rocks. This formation is a cream, white, grey, brownish red, or purple medium-grained sandstone to orthoquartzite. Ferruginous, rusty sandstone is common in places. The formation is described in detail by M. L. Keith (1946). Wilson (1946, p.11) stated that the maximum thickness of the formation yet found in wells at Ottawa is 280 feet, but thicknesses up to 500 feet are reported in Quebec.

The sandstones that form the basal unit of Paleozoic rocks in the Ottawa-St. Lawrence Basin were formerly correlated with the Potsdam Sandstone of New York State, which is of Cambrian age. In mapping the basin, Wilson (1946) used the term Nepean Sandstone instead of Potsdam; she named the formation from Nepean Township at Ottawa where the sandstone was extensively quarried. The upper contact of the Nepean Sandstone with the March Formation, of the Beekmantown Group, is gradational and the March Formation consists of interbedded sandstone of Nepean lithology, and dolomite. Recent work on conodonts, by Greggs and Bond (1971), has dated the March Sandstones as Lower Ordovician, but the age and status of the Nepean or Potsdam Sandstone is still in question. It has been suggested that the Potsdam should be a group, with the Nepean being the uppermost formation.

The Potsdam or Nepean Sandstone of the Ottawa-St. Lawrence Basin was formerly quarried for use as a building stone at Brockville, Westport, Perth, and Ottawa. It was used in the construction of the Parliament Buildings at Ottawa. The sandstone has also been investigated as a source of silica sand (Keith 1946; Hewitt 1963), and has been quarried near Almonte and Smiths Falls as silica sand for sand-lime brick manufacture.

Ordovician

LOWER ORDOVICIAN

Beekmantown Group

The dolomite and sandstone of the Beekmantown Group of Lower Ordovician age outcrop in a wide area on the western flank of the Ottawa-St. Lawrence Basin in Leeds, Lanark, Carleton, Grenville, and Dundas Counties. Wilson (1946, p.12-17) has divided the Beekmantown Group of the Ottawa-St. Lawrence Basin into the March Formation, which overlies the Potsdam or Nepean Sandstone, and the Oxford Formation, which overlies the March Formation.

The March Formation overlies the Potsdam (Nepean) Sandstone conformably and interfingers with the Potsdam Sandstone. The March Formation consists of alternating beds of grey sandstone, sandy dolomite, and dolomite, which weather

rusty-brown; they are transition beds from the Potsdam (Nepean) Sandstone to the Beekmantown Dolomite. Wilson (1946, p.13) gave a thickness of 25 to 30 feet for the March Formation.

The Oxford Formation overlies the March Formation and consists of medium- to thick-bedded, dark grey, rusty-weathering dolomite. Wilson (1946, p.15) gave the maximum thickness of the Oxford and March Formations together as 350 feet. The Oxford Dolomite is quarried for concrete aggregate and road stone at Ottawa, Iroquois, Brockville, Athens, Jasper, Harlem, and Smiths Falls.

MIDDLE ORDOVICIAN

Chazy Group

The limestone, shale, and minor sandstone of the Chazy Group outcrop in narrow bands overlying the Beekmantown Dolomite in Dundas, Glengarry, Prescott, Russell, Stormont, and Carleton Counties. Wilson (1946, p.17-21) divided the Chazy Group of Middle Ordovician age into the Rockcliffe and St. Martin Formations.

The Rockcliffe Formation disconformably overlies the Oxford Formation of the Beekmantown Group and consists of friable olive-green shale with lenses of fine-grained grey sandstone. The average thickness of the Rockcliffe Formation is 150 to 160 feet (Wilson 1946, p.18).

The St. Martin Formation conformably overlies the Rockcliffe Formation and consists of grey limestone with some interbeds of dark shale and sandstone. Wilson (1946, p.20) stated that the St. Martin Formation was thickest in the eastern part of the basin and thinned to the west towards Ottawa. Thicknesses vary from 20 feet near Ottawa to 155 feet near Alexandria.

Trenton and Black River Groups

The limestones of the Trenton and Black River Groups (Simcoe Group) outcrop extensively in the Ottawa-St. Lawrence Basin in Carleton, Russell, Prescott, Dundas, Stormont, Renfrew, and Glengarry Counties. The rocks of these groups are dominantly limestone, shaly limestone, and dolomitic limestone ranging from medium- to thick-bedded. In colour the limestones range from grey to black. Chert is present in some beds. The limestones range from microcrystalline to crystalline in grain size. The maximum thickness of combined Black River and Trenton limestones in the Ottawa area is about 700 feet.

The Trenton and Black River limestones were mapped by Wilson (1946) as the Ottawa Formation. On Map 852A, accompanying Memoir 241, Wilson (1946) showed biostratigraphic subdivisions of the Ottawa Formation into Pamelia beds, Lowville beds, Leray beds, Rockland beds, Hull beds, Sherman Fall beds, and Cobourg beds. In central Ontario, west of the Frontenac Axis, Liberty (1969) subdivided the Trenton and Black River limestones (the Simcoe Group) on a lithostratigraphic basis into four formations. These formations have been mapped in outcrop from Georgian Bay to the Frontenac Axis. So far these lithostratigraphic formations have not been extended formally east of the Frontenac Axis.

UPPER ORDOVICIAN

Eastview Formation

The Eastview Formation, which correlates with the lower member of the Whitby Formation (the Collingwood biostratigraphic beds) outcrops in the Ottawa area as a narrow band that is not differentiated from the Billings Formation on the map (Map 2254, back pocket). The formation consists of dark grey limestone with interbedded black fissile shale. The lower contact is thought to be disconformable (Wilson 1946, p.26). The formation has a thickness of about 20 feet.

Billings Formation

The Billings Formation, which correlates with the Whitby Formation's middle member in central southern Ontario, outcrops east of Ottawa in a narrow band extending across Carleton and Russell Counties. The formation consists of brown shale that passes upwards into black fissile shale. It rests conformably on the Eastview Limestone. The Billings Formation probably has a thickness of 260 to 300 feet (Wilson 1946, p.27).

Carlsbad and Russell Formations

These formations correlate with the Georgian Bay Formation of central southern Ontario. The Carlsbad Shale conformably overlies the Billings Shale and outcrops east of Ottawa in Carleton and Russell Counties. The formation is composed of grey shale with some bands of impure limestone and dolomite. The maximum thickness of the shale is estimated at 500 to 550 feet (Wilson 1946, p.29).

The Russell Formation conformably overlies the Carlsbad Shale and consists of grey shale and interbedded rusty-weathering dolomitic limestone (Wilson 1946, p.30). The formation occupies a small area north and west of Russell Village in Russell Township, marginal to the Queenston Formation. The thickness of the formation is not known; the formation is not known to outcrop and investigators have difficulty in recognizing the unit in subsurface.

Queenston Formation

The Upper Ordovician Queenston Formation outcrops in a small area east of Ottawa straddling the Carleton-Russell county boundary. The formation consists of red shale with some green mottling. The combined thickness of the Russell and Queenston Formations is about 100 feet. The Queenston Shale is quarried for the manufacture of brick in the Ottawa plant of Domtar Construction Materials Limited.

CENTRAL AND SOUTHERN ONTARIO

South-central and southwestern Ontario are underlain by Cambrian, Ordovician, Silurian, and Devonian rocks. The Table of Formations is given in Table 1.

Table 1 TABLE OF FORMATIONS OF PALEOZOIC ROCKS FOR CENTRAL AND SOUTHWESTERN ONTARIO

System	Sub-system	Formation or Group	Lithology
Devonian	Upper Devonian	Port Lambton Formation	Grey to black shale, sandstone, siltstone
		Kettle Point Formation	Black shale
	Middle Devonian	Hamilton Formation	Grey shale and argillaceous limestone
		Dundee Formation	Limestone, chert
		Detroit River Group	Brown limestone and dolomite
		Bois Blanc Formation	Limestone, dolomite, chert, sandstone
	Lower Devonian	Oriskany Formation	Sandstone
Silurian	Upper Silurian	Bass Islands (Bertie) Formation	Buff dolomite
		Salina Formation	Dolomite, shale, gypsum, salt
	Middle and Lower Silurian	Guelph Formation	Dolomite
		Lockport-Amabel Formations	Dolomite
		Clinton-Cataract Groups	Shale, sandstone, dolomite, limestone
Ordovician	Upper Ordovician	Queenston Formation	Red shale
		Georgian Bay Formation	Grey and black shale, limestone
		Whitby Formation	Grey and black shale
	Middle Ordovician	Simcoe (Trenton-Black River) Group	Limestone
Cambrian(?)		Potsdam Formation	Sandstone

Cambrian(?)

Potsdam Formation

The principal outcrops of Potsdam Sandstone on the western side of the Frontenac Axis are along the Rideau River and St. Lawrence River in Pittsburgh and Storrington Townships. The Potsdam Sandstone rests unconformably on the Precambrian basement rocks. The lithology is the same as previously described and the uppermost strata may be Early Ordovician in age (Liberty 1971). The maximum thickness of the Potsdam Sandstone in this area is about 150 feet.

Building-stone quarries are operated in Pittsburgh and Storrington Townships. Attractive sandstone ashlar of buff and brownish red hues are produced. Silica sand was formerly produced by Kingston Silica Mines Limited near Joyceville. In 1971, Canada Cement Lafarge Limited opened a silica sandstone quarry in Pittsburgh Township just north of Highway 2 west of Gananoque to provide silica sand for the manufacture of portland cement.

Ordovician

MIDDLE ORDOVICIAN

Shadow Lake Formation

The Shadow Lake Formation (not shown on Map 2254, back pocket) redefined by Liberty (1969, p.15) consists of basal arkose, red and green shale, ranging from zero to 40 feet in thickness, resting on the Precambrian basement or in places on the Potsdam Sandstone. It may pass transitionally into the overlying limestones of the Gull River Formation.

Simcoe Group

The term Simcoe Group was introduced and defined by Liberty (1955; 1969) for the Black River and Trenton limestones that lie above the Shadow Lake Formation in the area between Georgian Bay and the Frontenac Axis. Liberty (1969) divided the Simcoe Group into the following formations in ascending order: Gull River Formation, Bobcaygeon Formation, Verulam Formation, and Lindsay Formation. A comparison of the new lithostratigraphic units of Liberty and the older biostratigraphic units are given in Table 2.

Table 2 COMPARISON OF LITHOSTRATIGRAPHIC AND BIOSTRATIGRAPHIC UNITS IN THE SIMCOE GROUP ROCKS; AFTER LIBERTY (1969, p.19)

	Lithostratigraphic Units	Biostratigraphic Units
Simcoe Group	Lindsay Formation	Cobourg
	Verulam Formation	Kirkfield-Sherman Fall-Cobourg
	Bobcaygeon Formation, upper member	Rockland-Kirkfield
	Bobcaygeon Formation, middle member	Rockland
	Bobcaygeon Formation, lower member	Chaumont (Leray)-Rockland
	Gull River Formation	Pamelia-Lowville- (Leray)-Chaumont
	Shadow Lake Formation	Pamelia

The Simcoe Group is composed of limestone, with interbeds of shale more common in the Verulam and Lindsay Formations. The total thickness of the group is 500 to 600 feet. Limestones of the Simcoe Group are quarried for crushed stone at Kingston, Napanee, Roblin, Gamebridge, and Uhthoff, and for the production of portland cement at Picton, Belleville, Colborne, and Bowmanville. The Gull River Formation was formerly quarried extensively as building stone at Kingston, Napanee, and Longford, and for the production of lime at Coboconk.

UPPER ORDOVICIAN

Whitby Formation

The Whitby Formation rests on the Lindsay Limestone and is the bedrock formation in parts of Durham, Ontario, York, and Simcoe Counties, in a band extending from Lake Ontario, in the vicinity of Whitby, to Collingwood, on Nottawasaga Bay. The term Whitby Formation replaces the biostratigraphic units Collingwood, Gloucester, and Blue Mountain. The formation consists of three members, a lower black shale member, a middle brown shale member, and an upper grey and blue shale member. The Whitby Formation is about 290 feet thick near Lake Ontario, thinning to about 170 feet thick along Nottawasaga Bay (Liberty 1969, p.67).

The Whitby Shale is quarried at the Bowmanville quarry of St. Marys Cement Company to mix with the Lindsay Limestone for the manufacture of portland cement. Test work by the Mines Branch at Ottawa has indicated that some samples of the lower member of the Whitby Formation will produce a satisfactory lightweight aggregate.

Georgian Bay Formation

The term Georgian Bay Formation has been proposed by Liberty (1969, p.73) for the lithostratigraphic unit of blue and grey shale, with some limestone interbeds, that overlies the Whitby Formation and underlies the Queenston Formation. The Georgian Bay Formation is the lithostratigraphic equivalent of the biostratigraphic Meaford and Dundas units referred to as the Meaford-Dundas Shale. The thickness of the Georgian Bay Formation ranges from 418 feet on Nottawasaga Bay to about 600 feet in the Toronto area.

The Georgian Bay Shale is used extensively for brick manufacture at Toronto and Cooksville. The shale is used to make expanded aggregate at Cooksville.

On Manitoulin Island the upper member of the Georgian Bay Formation can be seen to advantage. It consists of limestone and dolomite and may be subdivided into two submembers of limestone and dolomite, and argillaceous limestone (the biostratigraphic Kagawong and Meaford units). The lower member of the Georgian Bay Formation is greyish blue shale with thin interbeds of finely crystalline limestone (the Wekwemikongsing biostratigraphic unit).

Queenston Formation

The Queenston Formation, which is a red shale, outcrops in a wide band at the base of the Niagara Escarpment from Queenston through Hamilton, Milton, and Brampton to the Bruce Peninsula. It is about 800 feet thick at St. Catharines, but thins northward to about 160 feet in the Bruce Peninsula to an arbitrary cut-off south of Tobermory (Liberty and Bolton 1971). There is a facies change between Cabot Head and Tobermory and the red shale of the Queenston Formation is not present on Manitoulin Island where the equivalent strata are in the upper member of the Georgian Bay Formation (Liberty 1971).

The Queenston Shale is widely used for brick and tile manufacture at St. Catharines, Grimsby, Hamilton, Palermo, Milton, Streetsville, Brampton, and Ottawa.

The Queenston Shale is the uppermost formation of Ordovician age in southern Ontario and is overlain by Silurian strata of the Cataract Group.

Silurian

MIDDLE AND LOWER SILURIAN

Clinton and Cataract Groups

Rocks of the Clinton and Cataract Groups outcrop along the face of the Niagara Escarpment from Niagara Falls to Manitoulin Island. The formations present in these groups are given in Table 3.

Table 3 FORMATIONS IN THE CLINTON AND CATARACT GROUPS IN SOUTHWESTERN ONTARIO; AFTER BOLTON (1957, p.5)

	Niagara Peninsula to Milton	Milton to Manitoulin Island
Clinton Group:		
Upper:	Decew Dolomite	
	Rochester Shale	
	Irondequoit Limestone	
Lower:	Reynales Dolomite	Fossil Hill Dolomite
	Neagha Shale	St. Edmund Dolomite
	Thorold Sandstone and Shale	Wingfield Shale and Dolomite
		Dyer Bay Dolomite
Cataract Group:		
	Grimsby Shale and Sandstone	Cabot Head Shale
	Power Glen Shale	Manitoulin Dolomite
	Whirlpool Sandstone	Whirlpool Sandstone

The combined thickness of the Clinton and Cataract Groups in the Niagara Peninsula is about 200 feet.

The Whirlpool Sandstone is quarried for building stone under the name "Credit Valley Sandstone" at Limehouse, Glen Williams, and Inglewood. It was formerly quarried at Thorold, Grimsby, Hamilton, Milton, Orangeville, and Duntroon (Hewitt 1964c). Where quarried, the sandstone is about 12 feet thick. The formation pinches out north of Duntroon.

The Manitoulin Formation makes up part of the face of the Niagara Escarpment from Stoney Creek north to Manitoulin Island. At Stoney Creek it consists of 4 feet of even-bedded bluish grey to buff, crystalline dolomitic limestone (Bolton 1957, p.14). At Hamilton it thickens to 11 feet, and at Canning Falls to 26 feet. From this point the thickness is fairly constant. The formation generally consists of thick- to thin-bedded, grey, buff-weathering, dense to fine-grained argillaceous dolomitic limestone with grey shale partings and lenses of white chert. It was formerly quarried for road stone at Duntroon and Owen Sound.

A summary of the formation making up the face of the Niagara Escarpment is given by Hewitt (1971, p.21-44).

Guelph-Lockport-Amabel Formations

The Guelph-Lockport Dolomites form the cap rock of the Niagara Escarpment and outcrop in a wide band from Niagara Falls, through Dundas and Guelph, to the Bruce Peninsula. In the vicinity of Waterdown the Lockport Formation undergoes a facies change and is known from Waterdown north to the Bruce Peninsula as the Amabel Formation (Bolton 1957).

The Lockport Dolomite, which overlies the Clinton Group, is divided into three members in ascending order: Gasport Dolomitic Limestone, Goat Island Dolomite, and Eramosa Dolomite. The Amabel Formation is 131 feet thick at the type section at Wiarton and consists of: an aphanitic to very finely crystalline blocky dolomite at the base called the Lions Head Member; a massive, fine to medium crystalline dolomite, the Colpoy Bay Member; a blue-grey mottled, fine to medium crystalline dolomite, the Wiarton Member; and a thin-bedded, brown, fine crystalline bituminous dolomite, the Eramosa Member (Bolton 1957, p.51).

The Guelph Formation, which overlies the Lockport and Amabel, is a buff-coloured, fine-grained sugary dolomite usually of high purity. The combined thickness of Guelph-Lockport and Guelph-Amabel dolomites ranges from about 200 feet in the Niagara Peninsula to over 400 feet in the Bruce Peninsula.

These formations are extensively quarried for crushed stone at Queenston, Thorold, St. Catharines, Vineland, Vinemount, Stoney Creek, Dundas, Nelson, Milton, Acton, Duntroon, and Owen Sound. They are quarried for building stone at Queenston and Wiarton, and for the manufacture of dolomitic lime at Guelph and Hespeler (Hewitt 1960; 1964a; 1964b).

UPPER SILURIAN

Salina Formation

The Salina Formation forms the bedrock in a belt 6 to 16 miles wide extending from the Niagara River, east of Welland, through Dunnville, Cayuga, Brantford, Paris, Kitchener, Elmira, Mount Forest, and Chesley to Lake Huron, just east of Southampton. The formation consists of eight members, which have not been named, but are designated by the letters A-1, A-2, B, C, D, E, F, and G. Units A-1, A-2, B, and D are mainly evaporite deposits of salt and anhydrite and are developed in the subsurface in southwestern Ontario. The Salina Formation consists of grey and red shale, grey-brown dolomite, minor limestone, and in places salt, anhydrite, and gypsum.

At Sarnia, where extensive beds of salt are present, the Salina has a thickness of 1,500 feet (Hewitt 1962); in Haldimand County the thickness is 310 feet (Sanford 1969a). Gypsum beds in the Salina Formation, from 4 to 11 feet thick, are mined at Hagersville and Caledonia (Guillet 1964). Salt beds in the Salina Formation are mined at Ojibway and Goderich, and salt is produced from brine wells at Amherstburg, Windsor, Sarnia, and Goderich by a number of companies (Hewitt 1962).

Bass Islands (Bertie) Formation

The Bass Islands (Bertie) Formation forms the bedrock in a narrow band extending from Fort Erie through Hagersville, New Hamburg, Harriston, and Walkerton to Southampton on Lake Huron. The formation consists of medium-bedded to massive-bedded aphanitic brown dolomite with minor thin-bedded shaly dolomite (Hewitt 1960, p.127). Along the outcrop area between Fort Erie and Hagersville the thickness varies from 35 to 60 feet. It thickens to 495 feet in the subsurface (Sanford 1968, p.19). Sanford (Map 1263A, 1969b) used the term Bertie Formation from Fort Erie to the vicinity of Hagersville and the term Bass Islands Formation north and west of Hagersville. The Formation is correlated with the Bass Islands Formation of Michigan.

The Bertie Dolomite is quarried for crushed stone at Fort Erie, Port Colborne, Dunnville, Cayuga, and Hagersville. It is the uppermost formation of the Silurian System in Ontario.

Devonian

LOWER DEVONIAN

Oriskany Formation

The only deposit of Oriskany Sandstone in Ontario is in Oneida and North Cayuga Townships, Haldimand County, 4 miles west of the Town of Cayuga.

Oriskany Sandstone underlies an area of less than a square mile. The formation is a medium light grey to white, medium-grained, irregularly thick-bedded sandstone. In places, brown iron staining is present. The formation rarely exceeds 15 feet in thickness.

The sandstone has been quarried for building stone, and as a source of silica and glass sand (Hewitt 1963, p.27).

MIDDLE DEVONIAN

Bois Blanc Formation

The Bois Blanc Formation is of Middle Devonian age and rests unconformably on the Upper Silurian Bass Islands (Bertie) Dolomite. The formation extends in a band, 3 to 10 miles wide, from Fort Erie through Hagersville, Woodstock, Milverton, and Listowel, to Port Elgin on Lake Huron. The Bois Blanc Formation consists of medium brownish grey, medium crystalline, medium- to thin-bedded cherty limestone. In many places the Springvale Sandstone Member occurs at the base of the formation. The thickness varies from 90 to 240 feet (Best 1953).

The Bois Blanc Limestone is quarried for crushed stone at Fort Erie, Port Colborne, Cayuga, and Hagersville.

Detroit River Group

The Detroit River Group, consisting of limestone and dolomite, forms a northwest-trending band extending from Norwich through Beachville, Stratford, and Wingham, to Kincardine on Lake Huron. The dip is southwest. Southeast of Norwich, the Detroit River Group pinches out, and in Norfolk County, between Norwich and Lake Erie, the overlying Dundee Formation rests directly on the underlying Bois Blanc Formation. Southeast of St. Marys, the Detroit River Group is mainly limestone; north of St. Marys, it is mainly dolomite; in the St. Marys area the dolomite and limestone facies interfinger. The thickness of the Detroit River Group increases from zero southeast of Norwich to 110 feet at Beachville, 197 feet at St. Marys, and 350 feet at Clinton (Best 1953).

The Detroit River Limestones are quarried for production of high-purity calcium limestone for lime, crushed stone, and fluxstone at Beachville, and for manufacture of portland cement at Zorra Station.

The Detroit River Group also outcrops on the western side of the Chatham Syncline in Essex County, where it is quarried at Amherstburg for crushed stone and lime manufacture (Hewitt 1960, p.146-168).

Dundee Formation

The Dundee Limestone occupies a wide belt extending from west of Port Stanley to east of Port Dover on Lake Erie, northwest to Lake Huron, where it

outcrops from southwest of Grand Bend to north of Goderich. The term Dundee replaces the term Delaware and includes all Delaware strata and the former Columbus Formation. The Dundee Formation consists of light brown, medium-grained limestone; some chert may be present. The formation has a thickness of 60 to 160 feet. The Dundee Limestone also outcrops in Essex County.

It is quarried near Port Dover and Amherstburg for the production of crushed stone, at St. Marys for the manufacture of portland cement.

Hamilton Formation

The Hamilton Formation, which rests conformably on the underlying Dundee Limestone, outcrops in Middlesex, Elgin, Lambton, Kent, and Essex Counties of southwestern Ontario. In lithology it consists predominantly of grey shale with interbeds of grey crystalline cherty limestone. The thickness of the formation ranges from 80 to 300 feet (Caley 1945, p.45).

The Hamilton Formation is comprised of the following members:

Ipperwash Member:	grey limestone;
Widder Member:	grey shale and limestone;
Hungry Hollow Member:	grey limestone and shale;
Arkona Member:	grey shale;
Rockport Quarry Member:	grey argillaceous limestone;
Bell Member:	grey shale;
Marcellus Member:	black shale.

The Hamilton Shale is quarried at Thedford and Arkona for the production of brick and tile. One of the limestone bands in the formation was quarried for crushed stone at Thedford (Hewitt 1964a, p.70).

UPPER DEVONIAN

Kettle Point Formation

The Kettle Point Formation outcrops principally in Lambton and Kent Counties. It is composed predominantly of thin-bedded, fissile grey to black bituminous shale, which at Kettle Point contains spherical concretions 8 inches to several feet in diameter. The thickness of the formation varies from 40 to 290 feet (Caley 1945, p.49).

Port Lambton Formation

"The Port Lambton beds form a narrow strip along the St. Clair river, from Port Lambton north through Sombra township into Moore township" (Sanford and Brady 1955, p.8). The formation consists of light-grey fissile shale, siltstone,

and light-grey sandstone. The formation has a thickness of up to 200 feet or more.

It is of Upper Devonian age and where divisible it is comprised of the following members:

Sunbury Member:	black shale;
Berea Member:	grey sandstone and siltstone;
Bedford Member:	grey shale.

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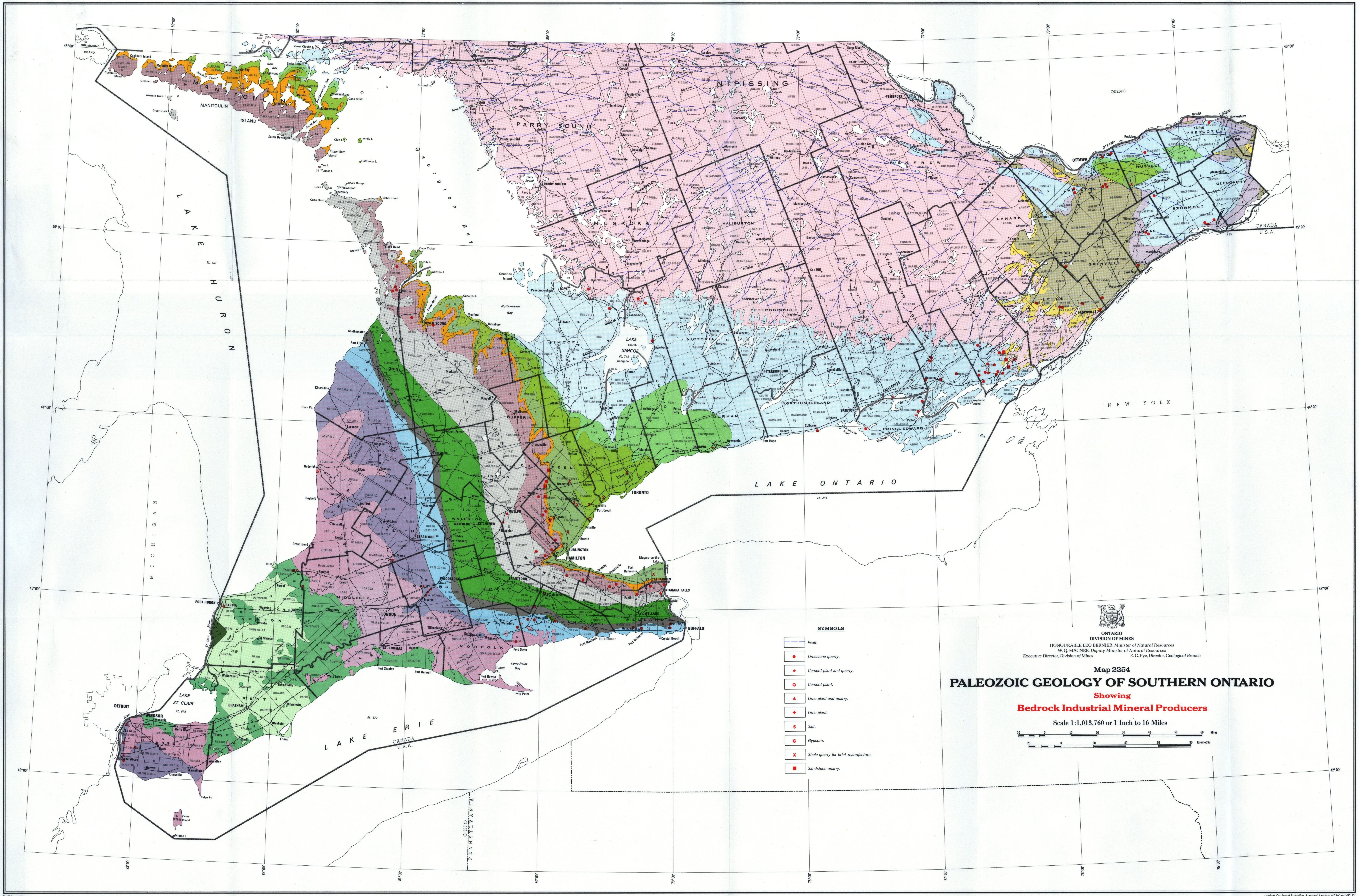

LEGEND

PALEOZOIC

DEVONIAN

UPPER DEVONIAN

PORT LAMBTON FORMATION
- 20 *Grey shale and sandstone.*

KETTLE POINT FORMATION
- 19 *Black shale.*

MIDDLE DEVONIAN

HAMILTON FORMATION
- 18 *Grey shale and limestone.*

DUNDEE FORMATION
- 17 *Limestone.*

DETROIT RIVER GROUP
- 16 *Limestone and dolomite.*

BOIS BLANC FORMATION
- 15 *Cherty limestone.*

LOWER DEVONIAN

ORISKANY FORMATION
- 14 *Sandstone.*

SILURIAN

UPPER SILURIAN

BASS ISLANDS (BERTIE) FORMATION
- 13 *Dolomite.*

SALINA FORMATION
- 12 *Dolomite, shale, gypsum, salt.*

MIDDLE AND LOWER SILURIAN

GUELPH FORMATION
- 11 *Dolomite.*

LOCKPORT-AMABEL FORMATIONS
- 10 *Dolomite.*

CLINTON AND CATARACT GROUPS
- 9 *Sandstone, shale, dolomite*[a].

ORDOVICIAN

UPPER ORDOVICIAN

QUEENSTON FORMATION
- 8 *Red shale.*

GEORGIAN BAY (CARLSBAD AND RUSSELL[b]) FORMATION
- 7 *Grey shale with limestone interbeds; limestone upper member on Manitoulin Island.*

WHITBY (EASTVIEW AND BILLINGS[b]) FORMATION
- 6 *Grey and black shale.*

MIDDLE ORDOVICIAN

SIMCOE GROUP (TRENTON-BLACK RIVER)
- 5 *Limestone (5d, Lindsay Formation; 5c, Verulam Formation; 5b, Bobcaygeon Formation; 5a, Gull River Formation).*

CHAZY GROUP
- 4 *Limestone and shale.*

LOWER ORDOVICIAN

BEEKMANTOWN GROUP
- 3 *Dolomite, sandstone.*

CAMBRO-ORDOVICIAN

POTSDAM OR NEPEAN FORMATION
- 2 *Sandstone.*

PRECAMBRIAN
- 1 *Precambrian rocks.*

[a]*Dolomite predominates on Manitoulin Island.*
[b]*Formations in Ottawa area.*

SOURCES OF INFORMATION

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Lambert Conformal Projection, Standard Parallels 44° 30′ and 53° 30′