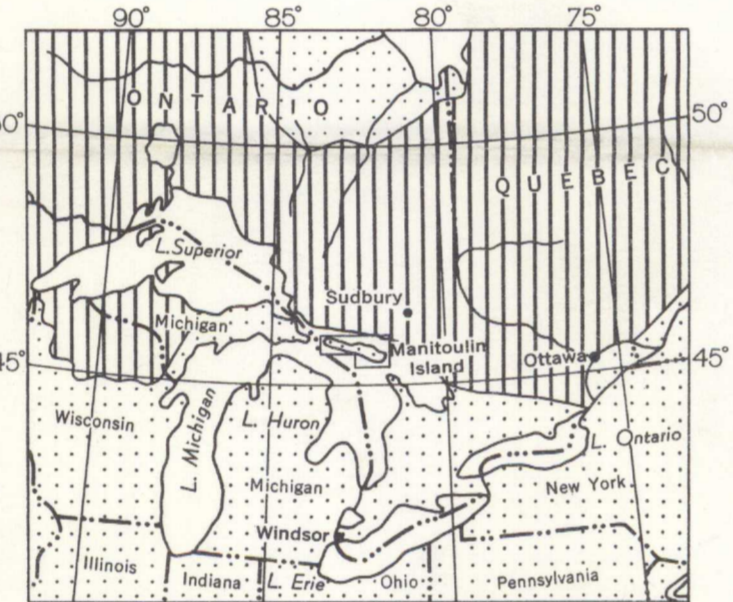


- LEGEND**
- SILURIAN**
- MIDDLE SILURIAN**
- 16 AMABEL FORMATION: grey and blue, fine crystalline dolomite
- 15 FOSSIL HILL FORMATION: brown, fine and medium crystalline dolomite
- 14 ST. EDMUND FORMATION: grey and light brown, lithographic to fine-crystalline dolomite
- 13 DYER BAY-WINGFIELD FORMATION: bluish and brownish grey, fine-crystalline dolomite; green shale
- LOWER SILURIAN**
- 12 CABOT HEAD FORMATION: red shale; minor green shale and dolomite
- 11 MANITOULIN FORMATION: brown and grey, fine crystalline dolomite
- ORDOVICIAN**
- UPPER ORDOVICIAN**
- 10 KAGAWONG FORMATION: brown and grey, fine-crystalline, limestone, dolomitic limestone and dolomite
- 8 MEAFORD FORMATION: grey and bluish-grey, fine-grained, argillaceous limestone, dolomitic limestone and dolomite
- 7 WEKWEKONGSING FORMATION: greyish blue with thin interbeds of grey, fine crystalline limestone
- 9 Undifferentiated 6, 7, and 8
- 6 SHEGUIANDAH FORMATION: grey and brown soft shale
- 5 Black fissile shale, minor black limestone; some conglomerate containing pebbles of Lorrain and Cobourg rocks (Collingwood strata)
- MIDDLE ORDOVICIAN**
- 4 COBOURG FORMATION: grey, fine crystalline limestone, lenses and beds of dolomite; some conglomerate
- 3 Grey to bluish grey, fine-, medium- and, coarse-crystalline limestone
- 2 CLOCHE ISLAND FORMATION: grey and brownish grey, fine- and medium-crystalline limestone; minor brown sublitographic limestone
- HURONIAN**
- 1a, LORRAIN FORMATION: grey and white, fine-grained, sandstone and quartzite; 1b, KILLARNEY FORMATION: red and grey granite



Index map showing regional geology

Air photographs covering this area may be obtained through the National Air Photographic Survey, Topographical Survey, Ottawa, Ontario

In response to public demand for earlier publication, Preliminary Series maps are now being issued in this simplified form, thereby effecting a substantial saving in time. There is no loss of information, but the maps will be clearer to read if all or some of the map-units are hand-coloured.

Cartography by the Geological Cartography Unit, 1957

CANADA  
DEPARTMENT  
OF  
MINES AND TECHNICAL SURVEYS  
GEOLOGICAL SURVEY OF CANADA

MAP 20-1957  
**MANITOULIN ISLAND**  
DISTRICT OF MANITOULIN  
ONTARIO

Scale: One Inch to Four Miles =  $\frac{1}{253,440}$   
Miles 4 2 0 4 8 12

Approximate magnetic declination, 5° 42' West

- Geological boundary (approximate) . . . . .
- Bedding (inclined) . . . . .
- Glacial striae . . . . .
- Anticline (defined) . . . . .
- Syncline (defined) . . . . .
- Quarry . . . . .
- Roads . . . . .
- Other roads . . . . .
- International boundary . . . . .
- Indian Reserve boundary . . . . .
- Intermittent stream . . . . .
- Marsh . . . . .
- Height in feet above mean sea-level . . . . . 731

The Lorrain formation (1a) occurs as 'hogback-like' ridges whose flanks are lapped by younger strata. Killarney granite (1b) occurs on Badgley Island and near Killarney.

The Cloche Island formation (2) includes important markers in higher levels. These are brown sublitographic limestone, dolomite in digitate and bedded form, and beds of minor bioclastic and fine granular limestone. Except in the northern part and near Sheguiandah, where there is overlap on the Precambrian surface, this formation lies on the Swift Current, although it and the underlying Basal beds formation do not outcrop within the map-area. Thickness, 80 to 135 feet.

Unit 3 comprises in ascending order the following types of limestone: bluish grey, soft, bioclastic, and argillaceous; grey, fine- and coarse-grained with shale partings; greyish blue, very fine crystalline and grey, fine-grained and argillaceous; and, at top, grey, medium- to coarse-crystalline, and bioclastic. The formation is easily eroded and generally lies in covered intervals. Thickness, 60 to 65 feet.

Conglomerate occurs locally in the upper part of the Cobourg formation (4) near 'inlier' ridges of Lorrain formation. A coralline biostrome is found in lowest strata. Thickness, 60 to 85 feet.

Unit 5 consists of strata of Collingwood age. Locally the lowest stratum is black limestone. The lowest black shale may appear 'rotten'; it contains sulphides and macerated fossil remains. Various parts of the section are calcareous or petroliiferous. Thickness, 0 to 30 feet.

Characteristic of the Sheguiandah formation (6) are bluish weathering shale and maroon shales. One or two small 6-inch thick lenses of fossiliferous limestone are known to occur. Thickness, 60 to 100 feet.

The Wekwekongsing formation (7) may in places be free of limestone beds. Where they occur they are only 1 inch to 1 1/2 inches thick and are separated by 6 inches to 3 feet of shale. Thickness, 150 to 330 feet.

The lower contact of the Meaford formation (8) has been arbitrarily drawn where the shale beds of the Wekwekongsing become reduced to shale partings in order that the Meaford be dominantly composed of carbonate rocks. Uppermost strata consist of yellow, clay-shale overlying a buff, fine crystalline dolomite. In the latter beds lies the Gore Bay biostrome. Thickness 50 feet.

The Kagawong formation (10) includes the two biostromes: Mudge Bay near the base, and Maple Point near the top. Most of the rock consists of coarse crystals of carbonate in a fine groundmass, dolomite being distinguishable from limestone only by the use of chemical indicator. The contact with the overlying Manitoulin dolomite may be gradational or moderately sharp. Thickness, 60 to 100 feet.

The Manitoulin formation (11) comprises both biostromal and biohermal facies. The biostromal facies, which is typical, is widespread and 20 feet thick at most places. Where present the bioherms are developed on this biostrome and project upwards an additional 50 to 60 feet. In these, some of the rock is very porous, medium to coarse crystalline dolomite that is commonly oil stained. Thickness, 20 to 85 feet.

In most places the Cabot Head (12) is present between the Manitoulin and the Dyer Bay-Wingfield strata. In areas where the Manitoulin bioherms are present, however, it appears to represent an inter-reef facies. The thickness of green sublitographic dolomite and silty textured dolomite increases westward. Thickness, 0 to 65 feet.

The Dyer Bay-Wingfield (13) strata are shown as a single map-unit. In ascending order, the formation comprises the following: bluish grey, fine crystalline dolomite; brownish grey, fine crystalline dolomite; green shale; purplish grey and greenish grey, very fine crystalline and sublitographic, laminated and thinly bedded dolomite; green shale. The dolomites are biostromal and related to the underlying Manitoulin and overlying St. Edmund.

**DESCRIPTIVE NOTES**

Fossil Hill biohermal complexes. The Dyer Bay comprises the lower two of the above lithologies and contains Virginia mayvillensis, the Wingfield the upper three. Where one thins the other thickens, the combined thickness remaining fairly constant. Thickness, 30 to 45 feet.

Included in the St. Edmund formation (14) are 6- to 36-inch thick units of brown, evenly textured, fine crystalline dolomite; within a section of 50 feet there may be several or none. A threefold subdivision is possible: a lower thinly laminated dolomite member, generally in covered intervals; a middle, typical, more heavily bedded member; and an upper, grey, fine crystalline and fine granular dolomite member. Thickness, 60 to 90 feet.

Within the dolomites typical of Fossil Hill formation (15) are 12- to 30-inch interbeds of brownish grey, evenly textured, very fine crystalline dolomite. Within the lowest few feet the first Pentamerus bank occurs, and the affinities of this unit with the Schoolcraft of northern Michigan may be traced as far eastward as Lake Kagawong. This is generally overlain by a biohermal complex with interbiohermal, flank and apical facies. Thickness, 50 to 135 feet.

The Amabel formation (16) in ascending order presents the following sequence: light grey to buff, fine crystalline dolomite; bluish grey mottled (blue when fresh), fine crystalline dolomite; grey with green maroon, and pink, fine crystalline dolomite (a knoll-interknoll facies); and finally a pink, fine crystalline to sublitographic dolomite. The Amabel is harder, tougher, and more brittle than the Fossil Hill. The whole is a reef complex, presenting biostromal, biohermal, knoll-interknoll, interbiohermal, flank and apical facies. Pentamerus banks occur consistently at several levels. Thickness, 50 to 150 feet.

The Guelph formation outcrops in the vicinity of Michael Bay and South Baymouth but is not shown on the map. It is predominantly a grey and yellow, fine crystalline and fine granular, soft dolomite. It is known to present at least biohermal and interbiohermal facies. Partial thickness, 30 feet.

The strata have a general southwesterly, monoclinical dip of 20 feet to the mile in the north, 90 to 100 feet to the mile near the St. Edmund escarpment, (the Niagara or Lockport escarpment) and less again to the south. Near North Channel, however, the strata here and there dip north from the west-trending anticline and terrace structure. The latter structure the writer interprets as reflection of ridges of Lorrain quartzite in the underlying Precambrian basement. These ridges may be seen on the adjoining islands and mainland and are considered to extend as far west as Meldrum Bay. Details are visible near Sheguiandah as well as the behaviour of the overlying strata. The steeper dips near the centre of the island may be due to strata flexing over the edge of a Precambrian terrace and lowest strata may possibly be truncated against the face of such a terrace.

In contrast to the transverse features just described, the headlands along the north shore appear to have developed from cross anticlines and the bays from cross synclines.

The present configuration of the north shore and the many large lakes nearby are the result of the successive drowning of the Cobourg, Upper Ordovician, and Dyer Bay-Wingfield escarpments, three of the four major cuestas that are the most pronounced topographic features of the area, and the ponding of drainage waters in front of the St. Edmund escarpment.

Concerning petroleum possibilities on Manitoulin Island, known to be present are: anticlinal and monoclinical structures, stratigraphic and structural traps, porous units for petroleum accumulation, and moderate sealing conditions. Carrier beds are known, and oil has been found in the past. One oil seep at least is still active. One unconformity and several diastems are known to exist in the section. The last structural movement is dated as late Pleistocene.

Also of economic interest is the presence of vast quantities of very pure sandstone and quartzite of the Lorrain formation, dolomite of the St. Edmund formation, petroliiferous shale of Collingwood age, and sand and gravel.

5.1.7 Manitoulin Island, Ont.  
A. Geol. Map 20-1957

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