

GLACIAL GEOLOGY OF THE WEST MANSFIELD QUADRANGLE, OHIO

GLACIAL GEOLOGY OF THE WEST MANSFIELD QUADRANGLE, LOGAN AND UNION COUNTIES, OHIO by Jane L. Forsyth 1968

STATE OF OHIO JAMES A. RHODES, GOVERNOR DEPARTMENT OF NATURAL RESOURCES
FRED E. MORR, DIRECTOR DIVISION OF GEOLOGICAL SURVEY HORACE R. COLLINS,
CHIEF

GLACIAL GEOLOGY

INTRODUCTION

Most of the land in this map area is flat to gently rolling, reflecting the presence of a thick mantle of glacial deposits over deeply buried bedrock. Only in the southwestern corner do increased elevations and steeper slopes mark the edge of the high bedrock hills of the Bellefontaine outlier. Bedrock is mainly Columbus Limestone of Devonian age and is exposed in only one place: along the small unnamed creek about a mile west of North Greenfield, on the west side of State Rte. 292. Farther west, the hills of the Bellefontaine outlier are held up by both the Columbus Limestone and the overlying Ohio Shale, also of Devonian age. The Ohio Shale is not present in the area of this map, but it is exposed in a number of outcrops less than a mile west of the southwestern corner of the quadrangle area. In the eastern part of the map area, the bedrock is largely dolomite of the Tymochtee Formation of Silurian age, and is buried beneath 100 feet of glacial drift. The nearest exposures of the dolomite are about two miles to the east, near York Center and Byhalia, in Union County.

GLACIAL DEPOSITS

All the glacial materials of the West Mansfield quadrangle area are of late Wisconsin age. Older glaciers (Illinoian and early Wisconsin) must have passed over this area because drift of these ages is present farther south, but no such deposits have been recognized here, though they are probably present locally at depth.

Of the several ages of late Wisconsin till recognized elsewhere in western Ohio—four in western Ohio generally (Forsyth, 1965), three in the East Liberty quadrangle area just to the south (Forsyth, 1967)—only one occurs in the area of the West Mansfield quadrangle. This is the Marysville Till (Forsyth, 1967), characterized by a high clay content (40-55 percent) and Miami 6B (Morley-Blount) soils. Characteristic color of this till, in both the B horizon of the soil and in the parent material below, is a dark chocolate brown. The high clay content is believed to represent the inclusion in the till of a large amount of lake clay, obtained by the glacier from deposits in an ice-dammed lake that was briefly present, to the north, before the advance of the ice that deposited the till.

Two clear-cut end moraines are shown on the map, separated by broad areas of ground moraine. The Broadway Moraine (named by Leverett, 1902, p. 531) cuts diagonally northwest-southeast across the area and is paralleled, along its outer margin, by Mill Creek. In the northeastern corner of the map area, the double Bokes Creek Moraine (Forsyth, 1956) also extends northwest-southeast, just north of Bokes Creek. East of this map area, the Bokes Creek Moraine bends southward and is apparently overridden by the Broadway Moraine because the outlines of the former can be traced to the northern edge of the higher Broadway Moraine and, beyond its outer margin, to the south (Forsyth, 1956). Such an interpretation would explain the low, discontinuous appearance of the Bokes Creek Moraine. Proof of this interpretation-Broadway till observed lying directly on till of the Bokes Creek Moraine-is impossible because no recognizable difference exists between these two tills. The Bokes Creek Moraine extends about ten miles farther south to the Powell Moraine and is believed to be contemporaneous with an early stage of that deposit. From this area in Union County the Powell Moraine extends northwestward, so that it lies less than a mile away from the southwestern corner of the West Mansfield map area. Morainic topography between the Powell and Broadway Moraines here seems unrelated to any single position of the ice edge and is believed to be due to a local response of the glacial margin to the steeply sloping surface of the Bellefontaine outlier to the west.

The Broadway Moraine, then, is the youngest in the area, the unnamed area of morainic topography in the southwest is next in age, and the overridden Bokes Creek Moraine is the oldest. The differences in age are not great, however, for all the moraines are made of the same late Wisconsin till (Marysville) and all have the same soil (Miami 6B) developed in them. The entire late Wisconsin retreat is known to have taken only 4,000 to 5,000 years (Goldthwait, 1958), so the Marysville Till in this area represents only a portion of one third of that rather limited late-glacial time, an interval lasting perhaps no more than 500 years.

Boulders are present throughout the area, but they occur in greatest numbers on and just north of the Broadway Moraine (small map). No adequate explanation is known for such a belt like distribution, though it is possible that, during a temporary retreat of the ice, surface erosion might produce a lag accumulation of boulders, which could be concentrated by a subsequent southward advance of the glacier.

BEDROCK SURFACE

The buried bedrock surface slopes gently northeastward from the steep Bellefontaine outlier. Slopes are steepest in the southwest (more than 100 feet per mile), are more gentle in the central area (20-40 feet per mile), and farther to the northeast are even more gentle (12-15 feet per mile). Two straight, narrow valleys, which deepen toward the northeast, are present, one directly under West Mansfield, and the second at a distance of one and a half miles to the northwest.

MINERAL RESOURCES

Only one small gravel deposit has been recognized. This is a small group

of kames in the southwestern part of the map area, but, though a pit was opened in them at one time, the gravel is dirty, of poor quality, and difficult to work, so the deposit has long ago been abandoned. It is possible also that small, thin accumulations of gravelly alluvium may occur along the major stream valleys, but in no place has a deposit of any economic importance been observed.

REFERENCES CITED

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EXPLANATION (see map for graphics)

- Stream alluvium
- Kame
- Marysville Till
 - Wme, end moraine
 - Wmg, ground moraine
- Boundary of deposit, dashed where approximate (see map for graphics)
- Contour on bedrock surface, dashed where approximate, omitted where data is lacking; contour interval 20 feet
- Gravel pit, inactive
- Bedrock exposure

DISTRIBUTION OF BOULDERS (see map for graphics)

Some spottiness of boulder data is due to rather widely spaced roads.

- 1-4 boulders per acre
- 5-12 boulders per acre
- >12 boulders per acre

BASE BY U.S. GEOLOGICAL SURVEY, 1961

10,000-foot grid based on Ohio coordinate system, north zone 1000-meter Universal Transverse Mercator grid ticks, zone 17 shown in blue.

Cartographic drafting by James A. Brown

SCALE 1:24000

(See graph on map)

CONTOUR INTERVAL 5 FEET DATUM IS MEAN SEA LEVEL

OHIO DIVISION OF GEOLOGICAL SURVEY REPORT OF INVESTIGATIONS NO. 69

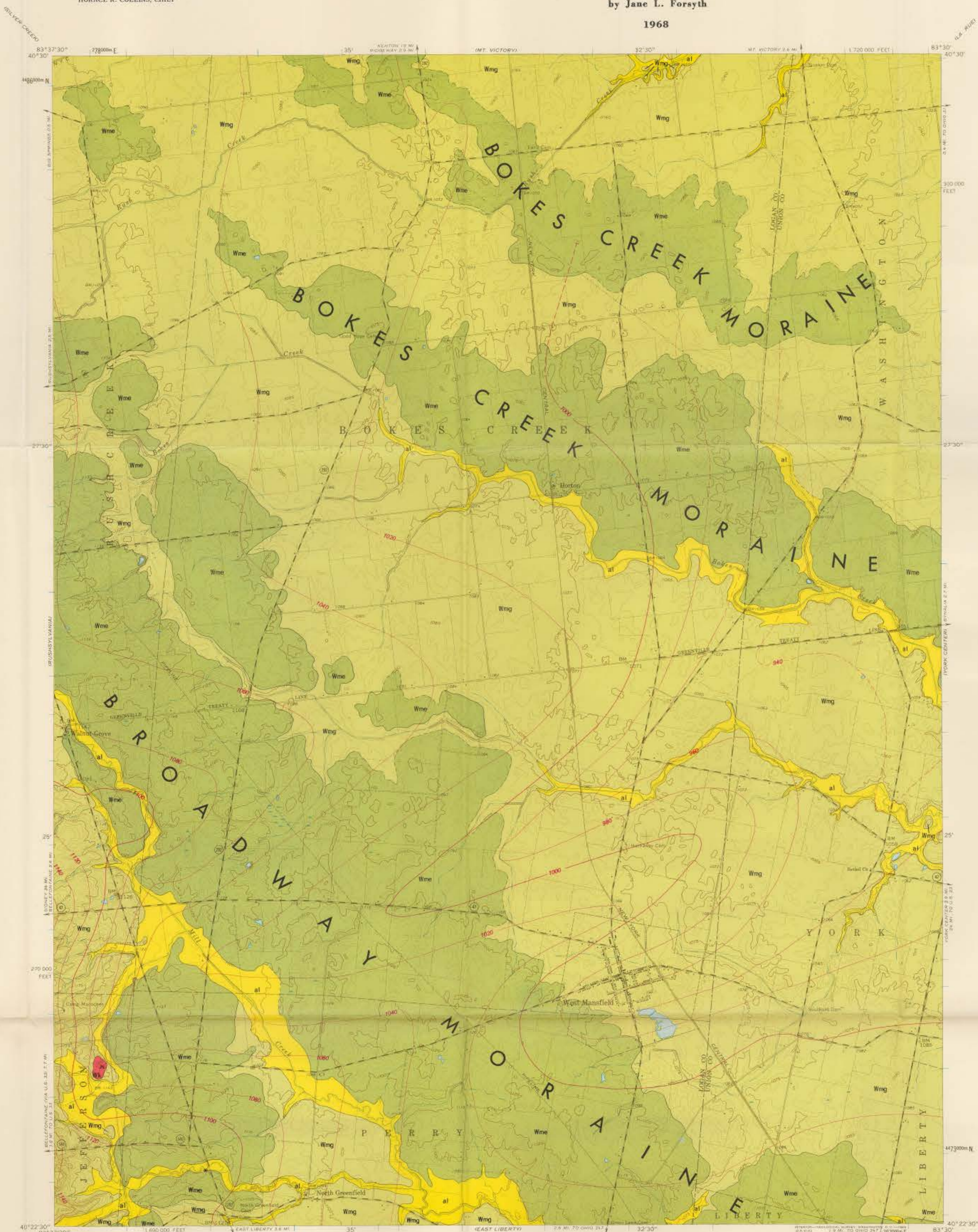
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RI-69 MAP - TEXT [OCR on map performed 3/12/15 Jana Murphy OSUL]

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 LOGAN AND UNION COUNTIES, OHIO

by Jane L. Forsyth

1968



EXPLANATION

Recent	al	Stream alluvium
	Wk	Kame
	Wme	Marysville Till Wme, end moraine Wmg, ground moraine

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BEDROCK SURFACE

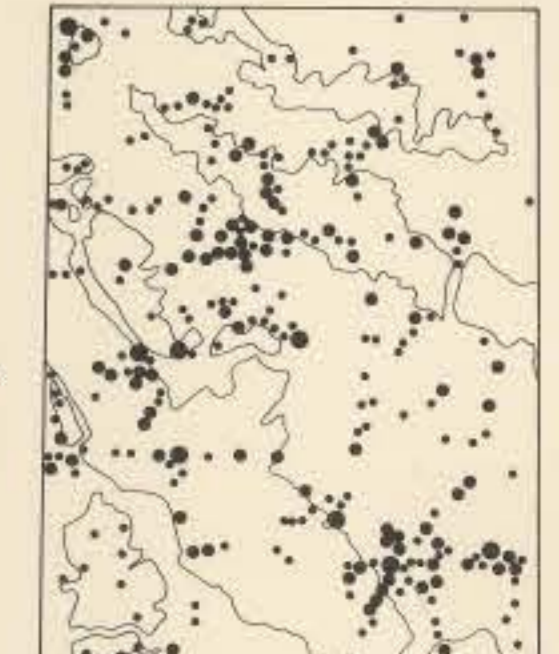
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Cartographic drafting by James A. Brown

APPROXIMATE MEAN
 DECLINATION, 1961

