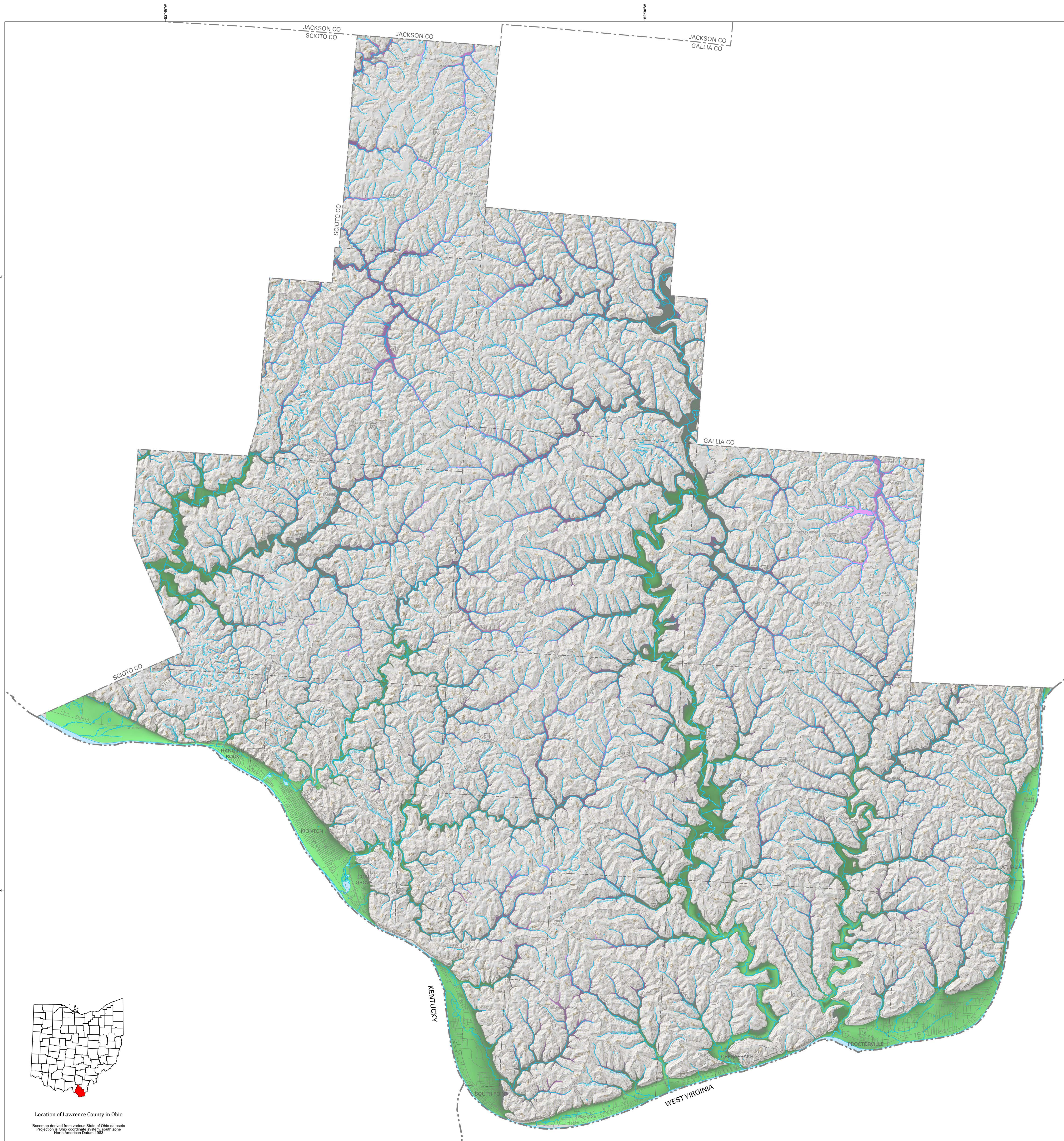


BEDROCK TOPOGRAPHY OF LAWRENCE COUNTY, OHIO

by
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with cartography by Dean R. Martin



LAWRENCE COUNTY BEDROCK TOPOGRAPHY

Lawrence County, located in south central Ohio, has a rugged surface topography with a maximum relief of 545 feet. The county's modern topography is a result of millions of years of geologic processes. The bedrock of Lawrence County was first deposited as sediments within the Appalachian Basin during the Pennsylvanian Period (323-299 million years ago [m.y.a.]). During the formation of the supercontinent Pangea, the Alleghenian Orogeny uplifted and tilted the recently tilted rocks, resulting in a plateau of gently eastward-sloping sedimentary rocks. After the Allegheny Plateau formed, rivers developed on the surface of the county, carving the landscape into upland bedrock hills and lowland valley regions and leading to the modern-day dissected plateau. The resulting bedrock hills of the county exhibit this ruggedness and therefore are considered entirely consolidated. In areas of minimal or no unconsolidated materials, the bedrock topographic surface is considered equal to the surface elevation.

Recent deposition of unconsolidated surficial materials are concentrated within the lowlands of the county. These unconsolidated sediments were deposited during the Quaternary Period (2.6 m.y.a.-present). They have significantly infilled and flattened the surface topography in most lowland areas, leading to areas of considerable unconsolidated sediment thickness. In general, the widths of lowland valleys are directly related to the thickness of unconsolidated materials found within them. The widest valley in the county, the Ohio River Valley, contains more than 100 feet of unconsolidated materials along its highest terraces. More moderately sized valleys, such as the Symmes Creek and Indian Gowan Creek Valleys, contain relatively moderate amounts of unconsolidated sediments ranging from 20 to 60 feet thick. The smallest tributary valleys in the county contain the thinnest packages of unconsolidated materials and are often areas where bedrock is exposed at the surface.

The unconsolidated sediment deposited during the Quaternary Period has not only altered the surficial elevation within the county, but also has altered drainage features. The history of Quaternary deposition reveals the processes by which unconsolidated sediments accumulate and change the course of drainage networks in the county. Unconsolidated materials in the Ohio River Valley were sourced from melting glaciers located in the northern reaches of the Ohio River watershed. The meltwater of the ice sheet in portions of northwestern Pennsylvania and northeastern Ohio eventually all flowed through the Ohio Valley in Lawrence County. This massive amount of meltwater and sediment led to a relatively high deposition rate that could not be matched by the local streams in Lawrence County. This disparity in sediment accumulation rates meant that local tributaries were dammed by sediments in the Ohio River Valley, forming slackwater lakes where rivers once flowed. The lake that occupied Symmes Creek Valley eventually became deep enough to overtop the paleodrainage divide at 38°35'32"N, 82°29'23"W. Before the Quaternary Period, this paleodrainage divide used to split surface water from flowing directly into the Tapsa River to the south and flowing into the Marietta River (a tributary of the Tapsa River) to the north. The overtopping of the paleodrainage divide by the slackwater lake formerly occupying Symmes Creek eroded away the ridge, leaving the bedrock surface and decreasing the bedrock topography in the modern Symmes Creek Valley north of the paleodivide. This process of slackwater lake development and restructuring of watersheds through stream piracy was common in southeastern Ohio during the Quaternary Period.

MAPPING CONVENTIONS

This map details the subsurface contact between the consolidated Paleozoic bedrock surface and the overlying unconsolidated Quaternary-aged sediments. This contact is expressed by elevation contours with a 5-foot interval. These contours were drawn in ArcGIS® software using expert knowledge of the surrounding geology and preglacial drainage features. Bedrock elevation contours are mapped to ground surface contours where both sets of lines meet at the surficial contact between consolidated and unconsolidated materials. Bedrock elevation contours from a variety of different verified sources were used during the contouring process. These data point sources include bedrock outcrop exposure observations, well logs (Fig. 1), and geotechnical boring logs.

The area covered by unconsolidated material was derived from the map of surficial geology of Lawrence County, Ohio (Nash, 2021).

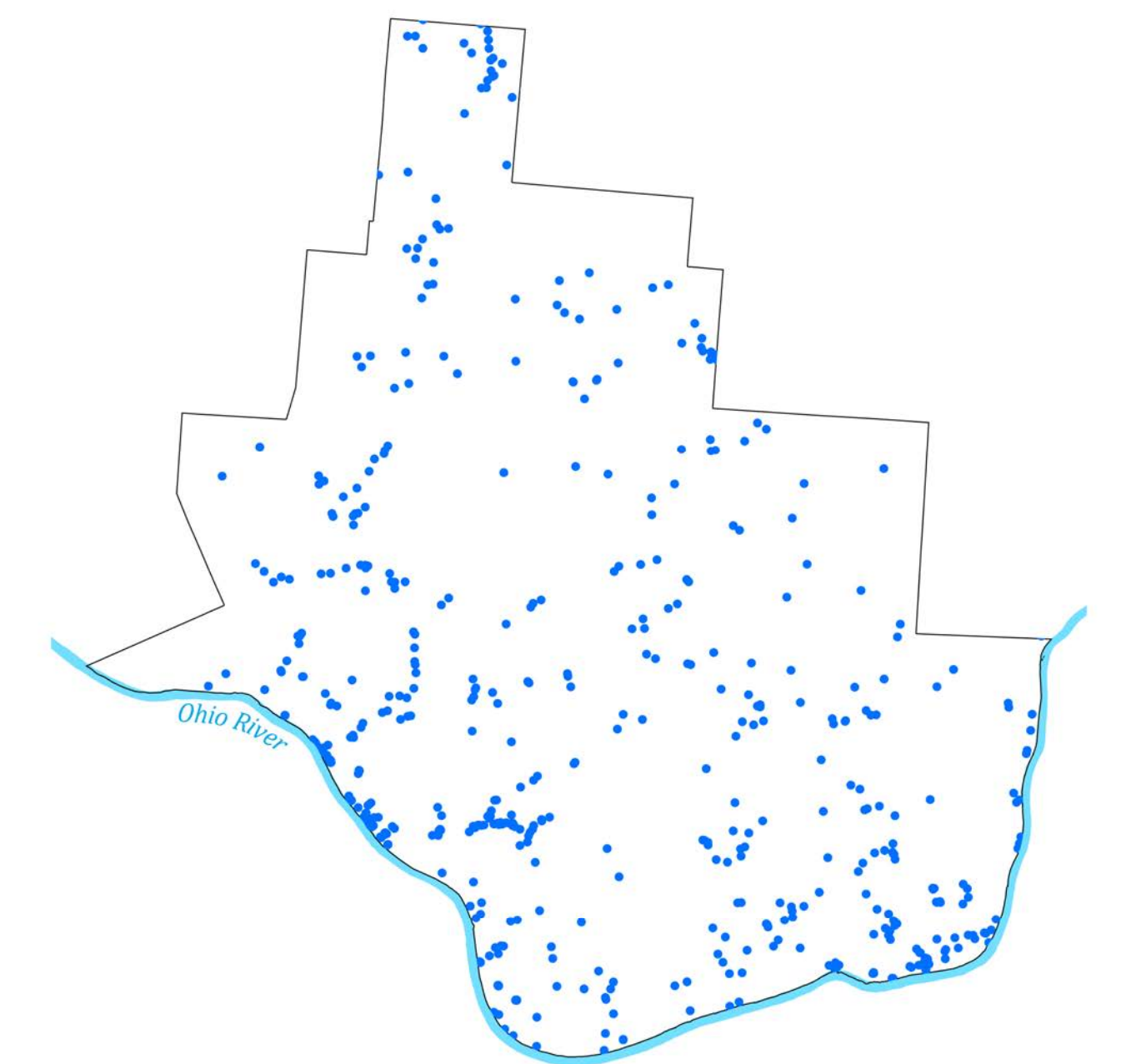
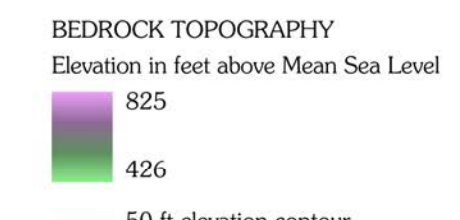


FIGURE 1. Location of water wells (dark blue dots) in Lawrence County, Ohio.



DATA SOURCES

Data were collected from numerous sources (see "References"). The concentration of data was greatest near the surface and decreased with depth. County soil survey maps, which describe the top 5 ft of surficial materials, provided an initial guide to map unit areas. These areas were modified through interpretation of local geologic settings and other data that indicated changes of deposits at depth, including water-well logs (Fig. 2) from the Ohio Department of Natural Resources (ODNR), Division of Water Resources; test-boring logs provided by the Ohio Department of Transportation, Office of Geotechnical Document Management system, available online at <https://gdm.odot.state.oh.us/ims>; and at Ohio Environmental Protection Agency and county engineers offices; theses, and published or unpublished geologic reports, maps, and field notes in file at the ODNR Division of Geological Survey. These data also provided the basis for lithologic unit descriptions that summarize, as accurately as possible, recognized associations of genetically related materials. Total thickness of each surficial deposit was calculated using ODNR Division of Geological Survey open-file bedrock topography maps, and bedrock units were summarized from ODNR Division of Geological Survey bedrock geology maps, all of which are available for each 7.5-minute quadrangle in the map area. The Ohio Statewide Imagery Program collected LIDAR data and converted it into a 2.5 x 2.5-ft-resolution digital elevation model (DEM). Using this DEM, the ODNR Division of Geological Survey generated a shaded relief and a percent slope digital model of the land surface.

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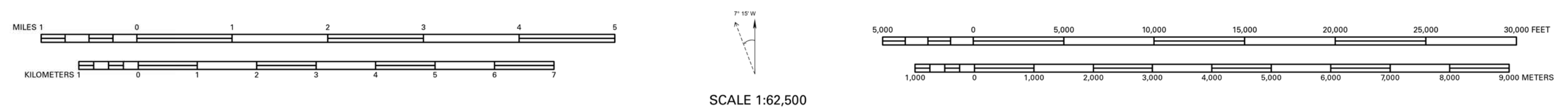
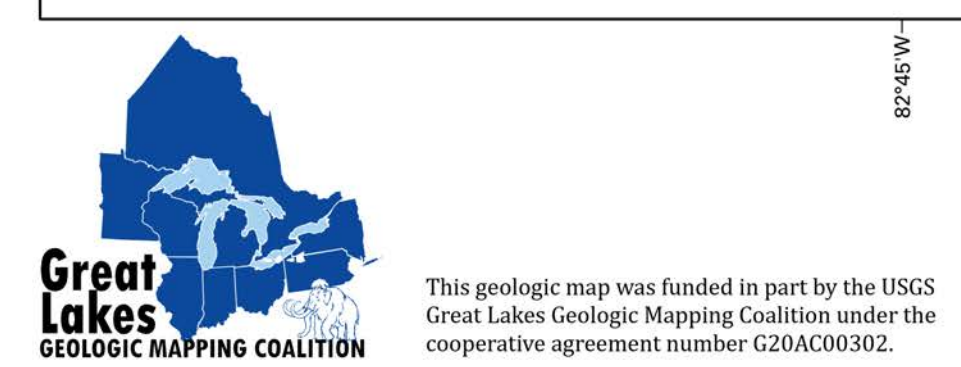
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Recommended Bibliographic Citation for this map:

Nash, T.A., 2021, Bedrock topography of Lawrence County, Ohio, Columbus, Ohio: Department of Natural Resources, Division of Geological Survey, BG-4c-LAW, scale 1:62,500.



Location of Lawrence County in Ohio
Basemap derived from various State of Ohio datasets
Projection is Ohio coordinate system south zone
North American Datum 1983



SCALE 1:62,500

