

## SURFICIAL GEOLOGIC MAP OF THE UNION 7.5-MINUTE QUADRANGLE, NORTHERN KENTUCKY

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Highway, roads, and streets from Kentucky Transportation Cabinet.

Hydrography from Hi-Res National Hydrography Data.

Hill shading derived from 1:24,000-scale USGS Digital Elevation Model.

Topography from 1:24,000-scale USGS Tagged Vector Contour data.

Lambert conformal projection, North American 1983 datum

Kentucky Single Zone State Plane Coordinate System.

Topographic contours and hill shading may not be current within areas of artificial fill.

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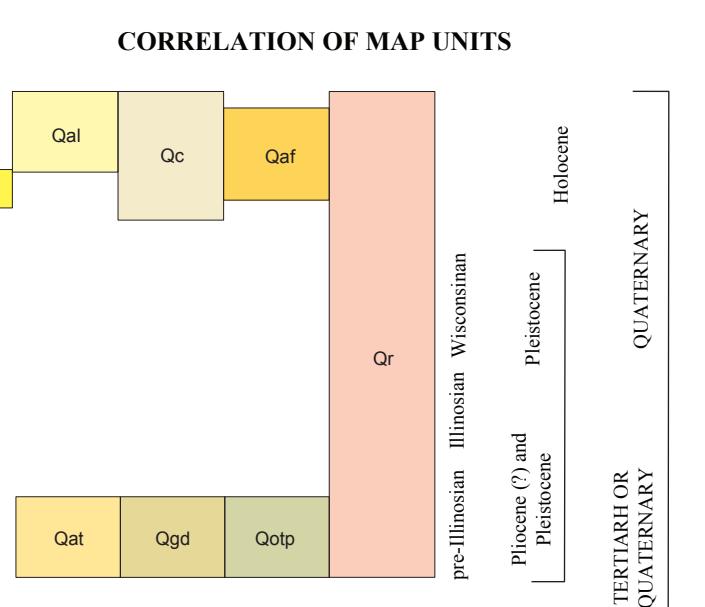
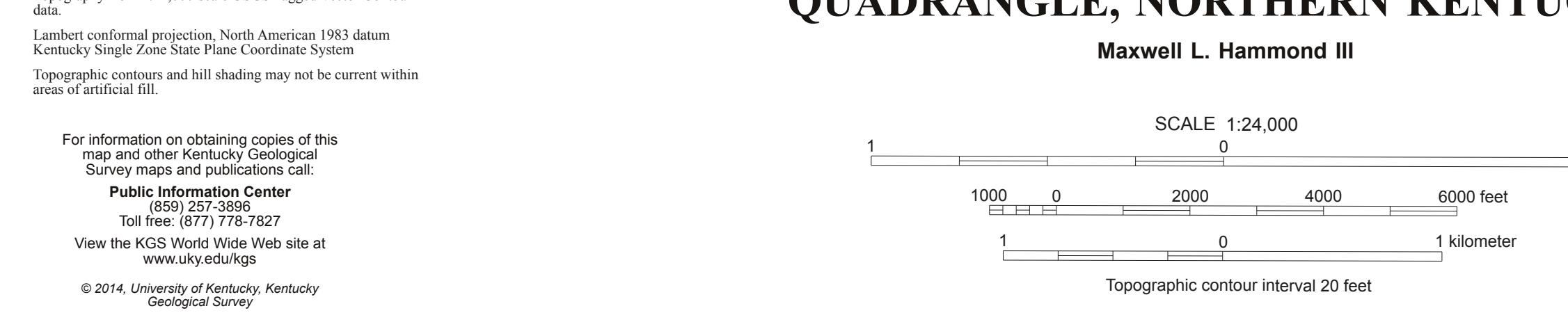
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### GEOLOGIC SUMMARY

#### Geologic Setting

The Union 7.5-min quadrangle is located in Boone County, Kentucky in the Outer Bluegrass Region of the state. Ordovician bedrock geology in the quadrangle consists of, in ascending order, the Kope Formation, the Fairview Formation, the Bellevue Tongue of Grant Lake Limestone, and the Bull Fork Formation. The Kope consists of approximately 75 percent shale and 25 percent limestone and is 220 to 235 ft thick, primarily exposed along stream valleys, lower parts of hills, and along railroad and road cuts. The Fairview is interbedded limestone and shale with 50 to 60 percent being limestone and is 95-110 ft thick, which occurs as a more resistant rock on hills and ridges. The Bellevue Tongue of the Grant Lake Limestone is a shelly rubble weathering limestone that has very thin discontinuous shale parting; it is 8 to 23 ft thick and is non-resistant and poorly exposed. The Bull Fork Formation is made up of interbedded limestone and shale with more 50-60 percent being limestone, it is approximately 90+ ft thick and poorly exposed. All of the formations are fossiliferous. This map shows the distribution of surficial deposits and the underlying bedrock (Swadley, 1969).

#### Geomorphology And Surficial Deposits

The units described on this map reflect natural processes collectively operating as a dynamic geomorphic system (Newell, 1978). The primary mechanisms of sediment transport and deposition in this area are flowing water (alluvial), glacial advances in the Pleistocene (glacial process), and gravity/mass-movement (colluvial processes), which are complexly interrelated. The map units in this area have been delineated based on the primary process generating the deposit or material. Soil survey maps and existing bedrock geologic maps served as the initial guide to mapping and these areas were modified through field identification, geomorphic setting, and well data. (Delineation and identification of all map units is restricted by the map scale of 1:24,000).

This map shows the distribution of surficial deposits of glacial drift (Qgd), glacial outwash (Qotp), residual soil (Or), colluvium (Qc), older alluvium (Qal), alluvial fans (Qaf), alluvial terrace deposits (Qat), and artificial/engineered fill (Af1). The distributions of these deposits are based on field observation, Natural Resource Conservation Service soil data, high resolution elevation data (LiDAR) and the geologic quadrangle map of Union.

Glacial deposits occur in most of the quad, with the only exception being the southeast corner. The Union quad has been effected by at least on Pre-Illinoian glacial event. Points on the map indicate areas where some of the glacial evidence was found. The area is heavily industrialized making the locating of outcrops difficult. Mapping of the unit was based on previous work from the NRCS Soil Survey and from the presence of igneous and metamorphic rocks scattered through the area.

Most of the alluvial deposits (Qal) occupy the Gunpowder and Big Bone Watersheds and parts of smaller tributary valleys. Alluvial deposits at Big Bone Lick State Park are renowned for the presence of Pleistocene mammal fossils. The glacial influence is supported by remnants being eroded by the drainages of the area and various igneous boulders. Residual soil (Or) mapped, primarily occurs on ridges and hilltops and in some small valleys with a low slope. There are glacial drift remnants in areas mapped as residuum, suggesting that glacial drift (Qgd) is widespread across the area. This soil locally includes loess that overlies or is mixed with the residuum. The Kope shale weathers easily, slumping and producing colluvial soils (Qc) of variable thickness. Composition of the colluvium ranges from clayey (predominantly illite) and silty to coarse with abundant limestone slabs.

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#### Acknowledgments

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Figure 2. Outcrop of glacial outwash in the western part of the quadrangle.

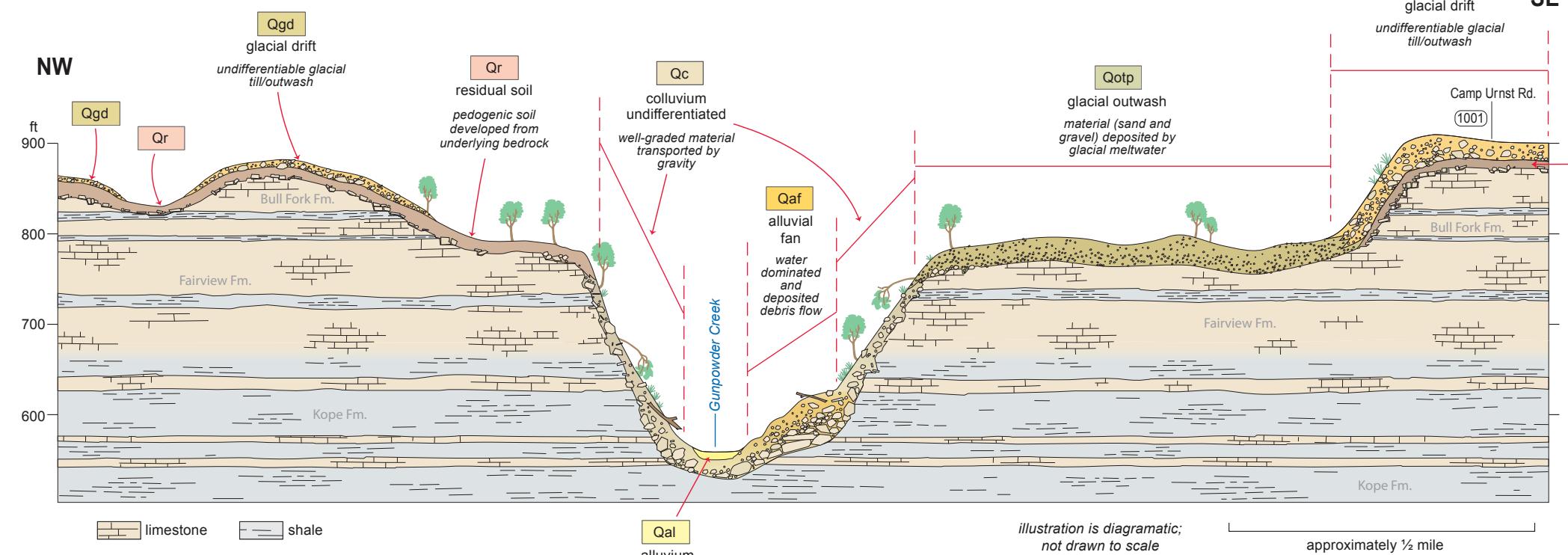


Figure 1. Generalized cross section; see approximate line of section in north-western corner of quadrangle

