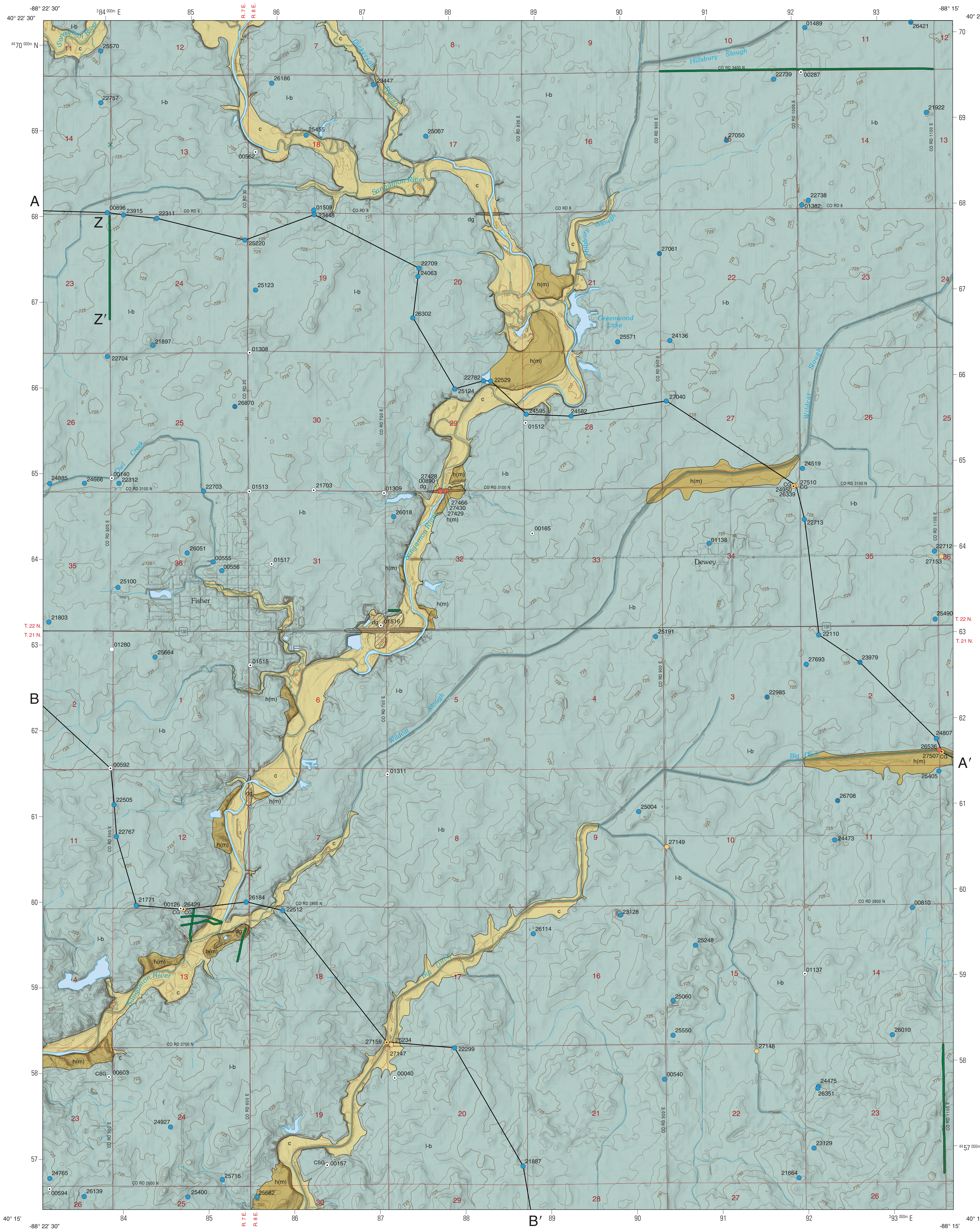
Prairie Research Institute
ILLINOIS STATE GEOLOGICAL SURVEY

SURFICIAL GEOLOGY OF FISHER QUADRANGLE
CHAMPAIGN COUNTY, ILLINOIS

STATEMAP Fisher-SG

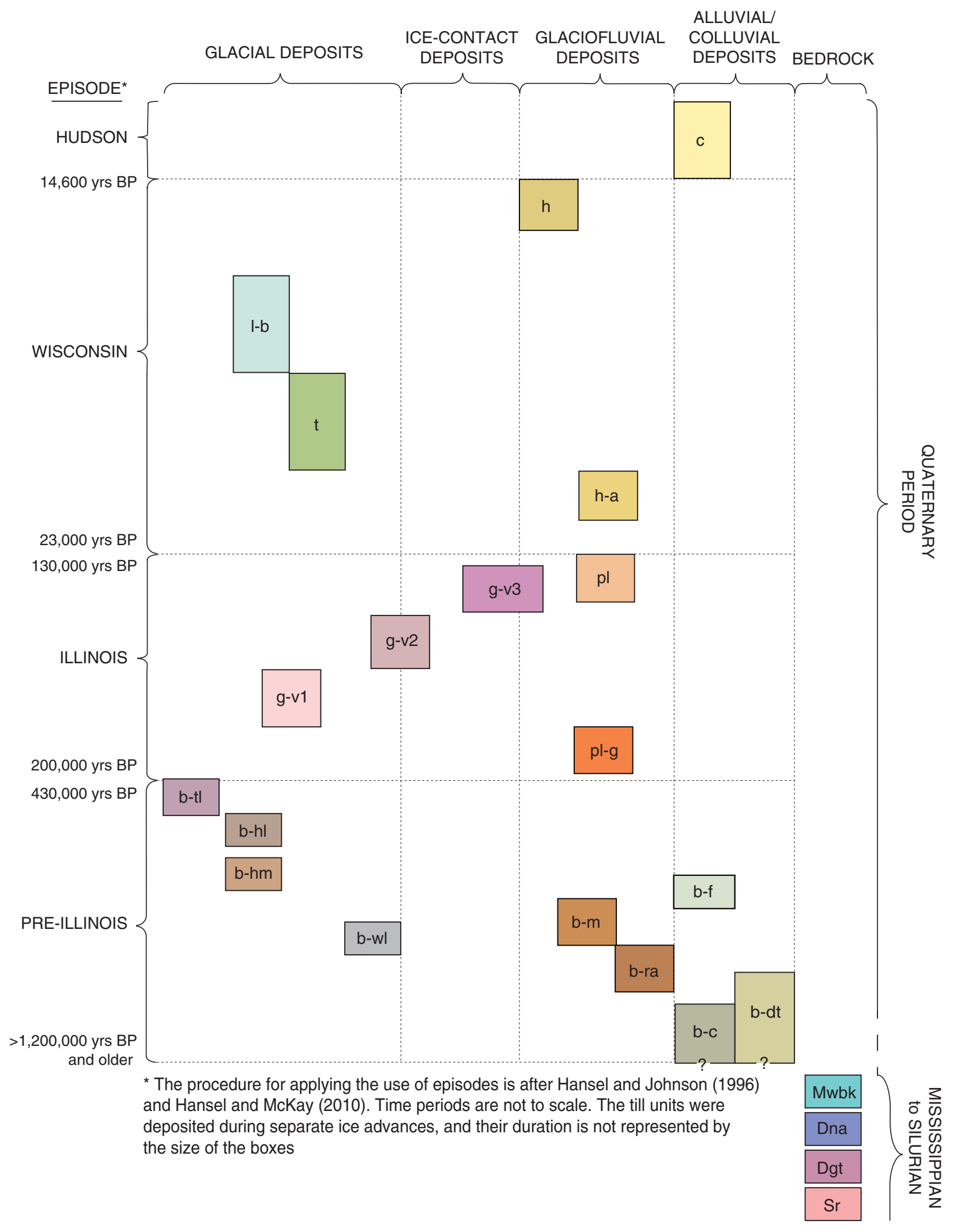
Andrew J. Stumpf
2022



QUATERNARY DEPOSITS

Description	Unit	Interpretation
HUDSON EPISODE (~14,600 years before present (B.P.) to today)[1]		
Areas of disturbed or removed geologic materials; texture ranges from clay to gravel; may include waste or rubble	Disturbed Ground ▨ dg	**Deposits disturbed or modified by human activity** in borrow and gravel pits and made land
Sand, silt, clay, and gravel; massive to stratified; contains beds of organic material; poorly sorted; brown to gray; locally oxidized; calcareous; up to 20 feet thick	Cahokia Formation (undivided) c	**Alluvium (stream deposits)** mapped in floodplains along rivers, creeks and ditches.
WISCONSIN EPISODE (~55,000– ~23,000 years B.P.)[1]		
Sand and gravel; contains some beds of silt; well to poorly sorted; brown to yellowish brown; calcareous; up to 20 feet thick	Mackinaw Facies, Henry Formation h(m)	**Glaciofluvial sediment (outwash)** deposited by glacial meltwater in streams and rivers that drained the former ice sheets
Diamicton or sand, silt and clay; contains beds of sand, silt, and gravel; diamicton is sandy loam to silt loam; gray to grayish brown; calcareous; stiff to very stiff; up to 60 feet thick	Batestown Member, Lemont Formation l-b	**Till and ice-marginal sediment** forms end moraines (Rantoul Moraine) and ground moraine; includes interstratified sorted sediments

CORRELATION OF MAPPING UNITS



* The procedure for applying the use of episodes is after Hansel and Johnson (1996) and Hansel and McKay (2010). Time periods are not to scale. The till units were deposited during separate ice advances, and their duration is not represented by the size of the boxes

A "Correlation of Map Units" chart illustrates the general interrelations of all the mapped units. Lithostratigraphic units in correlation diagrams are arranged in vertical columns and in chronologic sequence, the youngest unit at the top and the oldest at the base. If two or more units have the same age, they are placed in separate boxes in separate columns but in the same horizontal position. The size of an individual box is determined by its relation to other units and not by its stratigraphic rank or thickness. Brackets to the right of the map-unit boxes delimit the Period.

Point Data Type

●	Stratigraphic boring
●	Water well boring
◉	Water well boring for irrigation
●	Engineering boring
○	Other Boring
×	Passive seismic sounding
SG ⊙ 26211	Labels indicate samples (S), core availability (C), or geophysical logs (G). Boring labels indicate the county identification number. Dot indicates boring is to bedrock.

Other Data

—	Contact
A — A′	Line of cross section
—	Electrical resistivity tomography survey

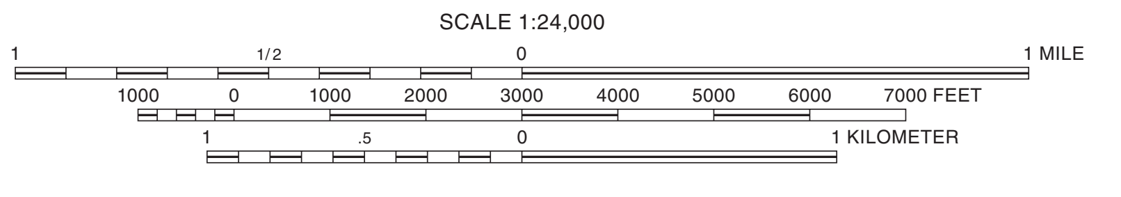
Boring labels indicate the county identification number. The county identification number is a portion of the 12-digit API number on file at the ISGS Geological Records Unit that references records in the ISGS Institutional Database. The geologic and geophysical logs are available from the ISGS websites ILWATER (http://www.isgs.illinois.edu/ilwater) and ILOIL (http://www.isgs.illinois.edu/illinois-oil-and-gas-resources-interactive-map).

Base map compiled by Illinois State Geological Survey from digital data (2021 US Topo) provided by the United States Geological Survey. Shaded relief and contours derived from Champaign County (2020) lidar elevation data provided through ILHMP.

North American Datum of 1983 (NAD 83)
Projection: Transverse Mercator
1,000-meter ticks: Universal Transverse Mercator grid system, zone 16

Recommended citation:
Stumpf, A.J., 2022, Surficial geology of Fisher Quadrangle, Champaign County, Illinois: Illinois State Geological Survey, USGS-STATEMAP contract report, STATEMAP Fisher-SG, 2 sheets, 1:24,000.

SCALE 1:24,000



BASE MAP CONTOUR INTERVAL 5 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1988

Geology based on field work by A.J. Stumpf, 2008–2022.

Digital cartography by K. Mandera, D. Lund, E. Bunse, Illinois State Geological Survey.

This geologic map was funded in part by the USGS National Cooperative Geologic Mapping Program under StateMap award number G21AC10861, 2021. The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. Government.

This map has not undergone the formal Illinois Geologic Quadrangle map review process. Whether or when this map will be formally reviewed and published depends on the resources and priorities of the ISGS.

The Illinois State Geological Survey and the University of Illinois make no guarantee, expressed or implied, regarding the correctness of the interpretations presented in this document and accept no liability for the consequences of decisions made by others on the basis of the information presented here. The geologic interpretations are based on data that may vary with respect to the accuracy of geographic location, the type and quantity of data available at each location, and the scientific and technical qualifications of the data sources. Maps or cross sections in this document are not meant to be enlarged.

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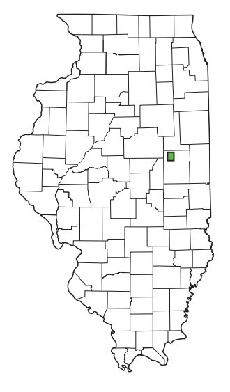
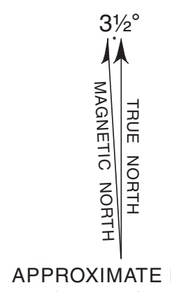


1	2	3
4	🟩	5
6	7	8

ADJOINING QUADRANGLES
1 Gibson City West
2 Gibson City East
3 Perdueville
4 Foosland
5 Rantoul
6 Mahomet
7 Rising
8 Thomasboro



APPROXIMATE MEAN DECLINATION, 2022

ROAD CLASSIFICATION

U.S. Route	⛉
Local road	—

Introduction

The Fisher Quadrangle is located in the northwestern part of Champaign County and includes the Village of Fisher and unincorporated areas (Fig. 1). The elevation of the land surface ranges from a minimum of 683 feet above sea level (asl.) in the Sangamon River valley in the southwestern part of the map area to over 787 feet asl. on the Rantoul Moraine. The map area contains a variety of landforms including moraines, morainal uplands, outwash plains, and floodplains and river channels. Glaciers flowed into the map area from ice sources located over Canada north and northeast of the Great Lakes and ice margins during retreat are marked by the end moraines, specifically the Rantoul Moraine (Fig. 1).

Methods

Surficial Geology Map

This surficial geology map was compiled using boring records, unpublished geologic field notes and geophysical reports from the ISGS, aerial imagery from Champaign County, and a U.S. Department of Agriculture (USDA) soil survey (Endres 2003; Soil Survey Staff 2021). Water wells and engineering borings shown on the surficial geology map were located with the best available data, including engineering drawings, historic property and tax records, historical and modern aerial photography, and online mapping systems (e.g., Google Maps). The wells and borings are located within 10 to 100 feet of their true locations.

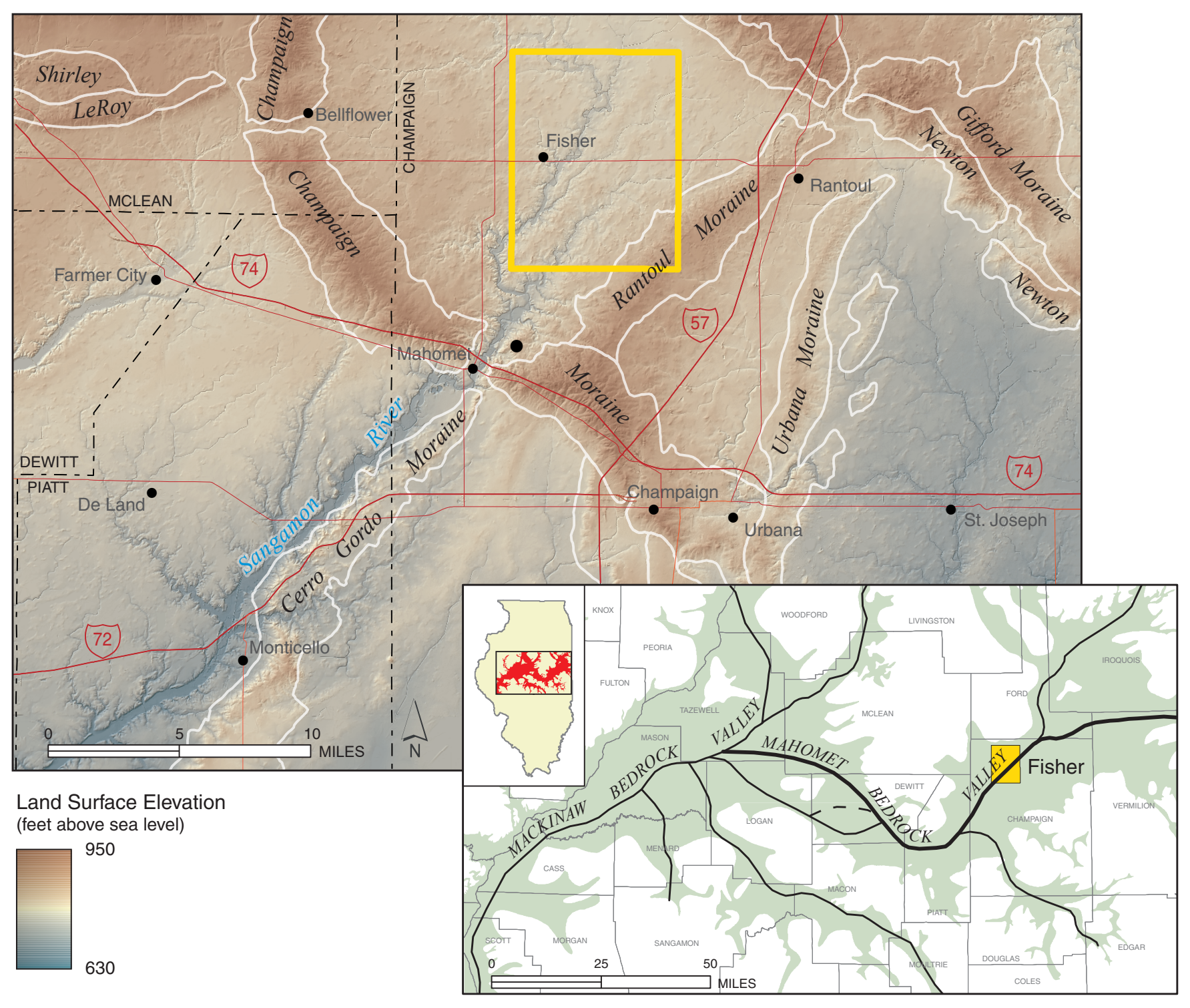


Figure 1 Location of the Fisher Quadrangle in east-central Illinois. The shaded relief basemap was produced from a digital elevation model (DEM) with 2-foot resolution. The named moraines are outlined in white. On the inset map, the axes (black lines) and extent (green shade) of bedrock valleys in east-central Illinois are shown. The bedrock valleys lie below ~500 feet asl. The Fisher Quadrangle is outlined in yellow.

Surficial geologic units were developed from soil-parent material data in the county soil survey (Soil Survey Staff 2021). A digital database accompanying the soil survey was queried to classify the parent material for each soil horizon. The parent material class of the lowest-most horizon of each soil was used to construct the surficial geology map. The parent material classes then were grouped into mapped lithostratigraphic units following Hansel and Johnson (1996), Willman and Frye (1970). It is assumed the thickness of each soil-parent material unit is at least 6 feet based upon the depth to which the soils are mapped.

The extent of the parent material-derived mapping units was adjusted according to information from borehole logs, field observations, or other geologic records. For example, coring of boreholes with the wireline method provided information about the surficial geology at two locations. The boreholes penetrated the entire fill of the MBV reaching the bedrock at depths of 236.5 feet and 274.5 feet. Natural gamma logs were collected in the boreholes. Further adjustments to the map polygons were made after the parent material/surficial geology information was draped on a 2-foot resolution LiDAR shaded relief map representing the topography of the land surface (ISGS 2020) and also historical orthophotography (ISGS 2010).

Bedrock Topography Map

The bedrock topography map (Fig. 2) was constructed by machine contouring of point observations and contour interpretations with the Topo to Raster tool of ArcGIS. The inputs to Topo to Raster were hand-drafted bedrock surface contour lines made for a Champaign County publication (Nelson, in prep.). The raster was outputted as a 25 m × 25 m grid.

Cross Sections

The two cross sections (A–A′ and B–B′) depict the geologic materials encountered from the land surface into the shallow bedrock along these transects. The cross sections were made by correlating the lithologic units from eight stratigraphic boreholes drilled by the ISGS (two of which were completed for this mapping) with geologic and geophysical logs in water wells, and coal and oil/gas exploration boreholes. These data are available from the ISGS Geologic Records Unit.

The cross section data compilation and analysis was accomplished using ESRI's ArcGIS® software (version 10.8.1). A customized tool for ArcMap (version 10.8.1) programmed at the ISGS (Carrell 2015) generated georeferenced cross sections from the lithologic data. Polygons for each geologic unit were drawn in ArcMap, and were later imported into Adobe Illustrator (version 25.0.0) for graphical editing using the MAPublisher plugin from Avenza Systems Inc. (version 10.9). In Illustrator, polygons were symbolized, line segments smoothed, and surrounding elements added to a standardized publication layout.

Geophysical Surveys

Electrical resistivity tomography (ERT) surveys were conducted for 1.45 miles over part of the MBV where the bedrock surface is at a depth of 250–300 feet (e.g., transect Z–Z′). Additional ERT data was previously collected over 3.67 miles for other projects. This geophysical method is used to measure the electrical properties of the geologic materials, where an electric current is transmitting into the ground and to determine the electrical potential. For example, sand and gravel have a higher electrical resistance or resistivity to the passage of an electrical current compared to clayey diamicton. Resistivity (resistance of a unit area of material divided by a unit length) is reported as ohm-meters and is the same regardless of the volume of the material. For all the profiles collected, a dipole-dipole ERT configuration was used and continuous resistivity measurements were obtained at stations 16 feet apart to a depth of ~265 feet. Borehole data was used to ground-truth the ERT data. Along the transects (e.g., Z–Z′, Fig. 3), the geologic units were correlated across the ERT profiles. Clay mineralogy data obtained from seventeen core samples will also be correlated with this geophysical data.

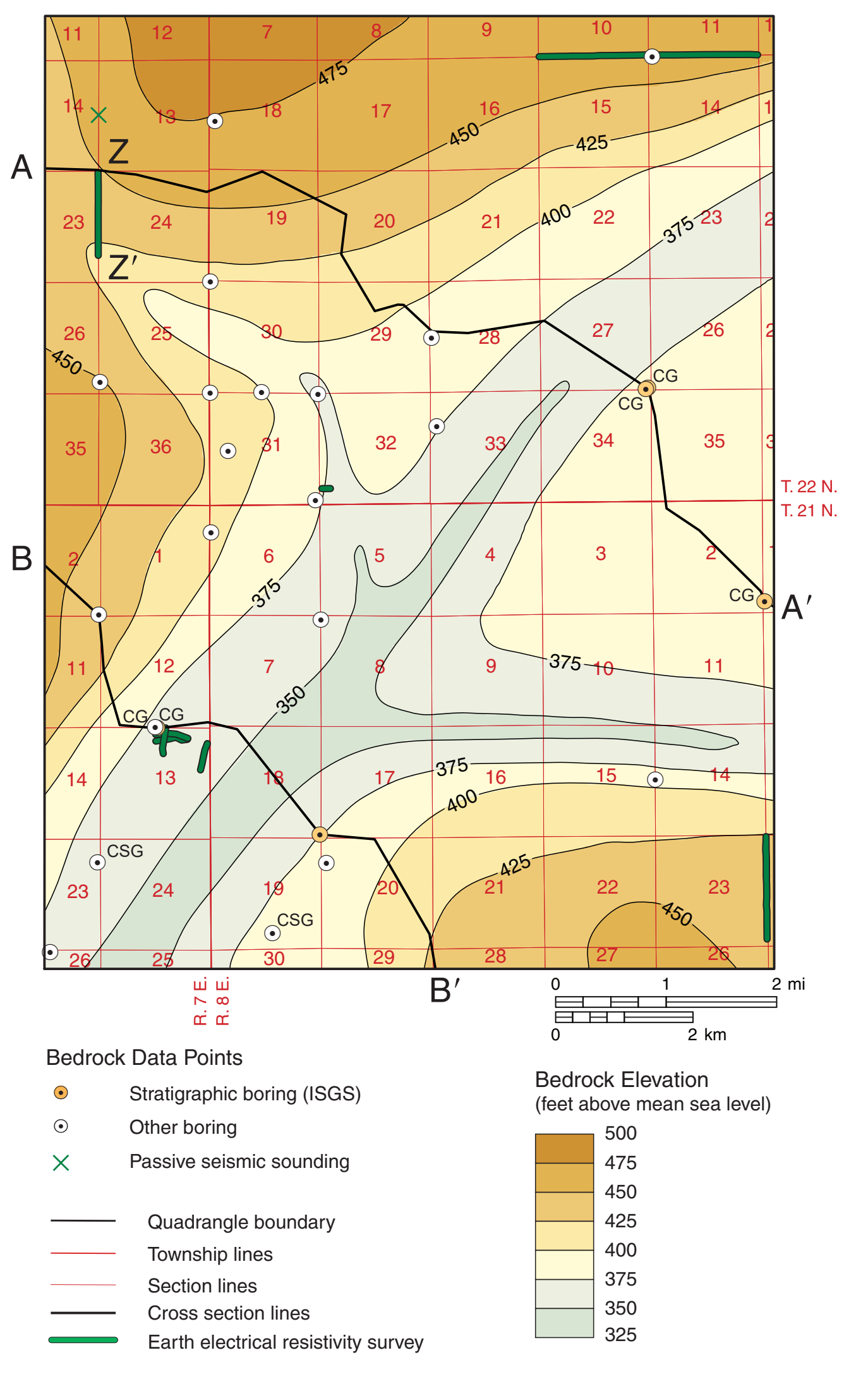


Figure 2 Contours of the bedrock topography in east-central Illinois on a colored shaded relief of the bedrock surface (from Nelson in prep.). Map scale is 1:100,000.

Important Findings

1. Stratigraphic boreholes drilled to the bedrock provided additional information about the elevation of the bedrock surface and the sequence of Quaternary sediments. The identification of geologic units in continuous cores from both stratigraphic test holes informed the drawing of cross section B–B′.

2. Key geologic units identified in the boreholes were diamicton (till) of the Vandalia Member (lower unit), sand and gravel of the Grigg tongue, sand and gravel of the Mahomet Sand Member. and diamicton (till) of the West Lebanon Member.

3. Over much of the quadrangle, confined aquifers in the Grigg tongue and Mahomet Sand Member appear to be hydrologically connected. Also, the Mahomet Sand Member pinches out towards the west (e.g., B–B′). In some areas, the confined aquifers in the Grigg tongue and overlying Pearl Formation also appear to be hydrologically connected.

4. The ERT profiles provided valuable information about the distribution and architecture of clayey and sandy glacial deposits in the upper ~300 feet in areas where drilling was not possible. The variations in electrical resistivity coincide with the geologic unit contacts identified in the cores.

5. Two lithostratigraphic units, the Dewitt and Rantoul members of the Banner Formation, were informally introduced in this mapping to represent distinctive deposits of sand and gravel at the bottom of the MBV. The units will be formalized in subsequent publications.

Acknowledgements

We thank the many landowners and land managers who helped us access to field sites. The ISGS drill team cheerfully managed a challenging schedule. Riley Balikian processed the acquired electrical resistivity profiles. John Nelson and Jeremy Breeden provided the information about the bedrock shown in the stratigraphic column and cross sections. Lori Woodward provided data entry assistance. Deette Lund and Katie Mandera compiled the cartography and graphics. The Champaign County Highway Department provided geologic logs from boreholes drilled to characterize subsurface conditions at bridge crossings.

This map was made possible by the U.S. Geological Survey National Cooperative Geologic Mapping Program under STATEMAP award number G21AC10861.

Also, the Fisher Quadrangle lies in the area of a multi-year project (2007 to 2010) funded by a private company (Illinois-American Water) to study the Mahomet aquifer in Champaign County and adjacent areas. Funds from that project were used to collect geological and geophysical information that was used in this mapping.

References

Carrell, J.E., 2015, Create 2D and 3D geologic cross sections: Illinois State Geological Survey [includes user guide, tutorial data, and computer codes], http://www.arcgis.com/home/4584a5e302e4014a495b8fc37fe0663

Endres, T.J., 2003, Soil survey of Champaign County, Illinois: United States Department of Agriculture, Natural Resources Conservation Service, 287 p., http://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/illinois/IL019/0/champaign_IL.pdf

Hansel, A.K., and W.H. Johnson, 1996, Wedron and Mason Groups: Lithostratigraphic re¬classification of deposits of the Wisconsin Episode, Lake Michigan Lobe area: Illinois State Geological Survey, Bulletin 104, 116 p., https://hdl.handle.net/2142/43938

Hansel, A.K., and E.D. McKay III, 2010, Quaternary Period, in D.R. Kolata and C.K. Nimz, eds., Geology of Illinois: Illinois State Geological Survey, p. 216–247.

Illinois State Geological Survey (ISGS), 2020, Illinois Height Modernization Program, Illinois State Geological Survey, and Illinois Department of Transportation, 2002-2020, Illinois LiDAR county database: Illinois State Geological Survey, https://clearinghouse.isgs.illinois.edu/distribute-east/champaign/champaign2020.zip

Illinois State Geological Survey (ISGS), 2010, 1937-1947 Illinois Historical Aerial Photography: Illinois State Geological Survey, https://clearinghouse.isgs.illinois.edu/data/imagery/1937-1947-illinois-historical-aerial-photography

Loke, M.H., and R.D. Barker, 1996, Rapid least-squares inversion of apparent resistivity pseudosections using a quasi-Newton method: Geophysical Prospecting, v. 44, p. 131–152, http://dx.doi.org/10.1111/j.1365-2478.1996.tb00142.x

Nelson, W.J., *in press*, Bedrock geology of Champaign County, Illinois: Champaign, Illinois, Illinois State Geological Survey, Bulletin.

Soil Survey Staff, 2021, Soil Survey Geographic (SSURGO) database for Champaign County, Illinois: U.S. Department of Agriculture, Natural Resources Conservation Service, Fort Worth, Texas, on-line data downloaded from https://websoilsurvey.sc.egov.usda.gov/DSD/Download/Cache/SSA/wss_SSA_IL019_soildb_US_2003_[2022-08-31].zip on September 16, 2021

Stuiver, M. and P.J. Reimer, 2020, CALIB Radiocarbon Calibration Program: v. 8.1.0, http://calib.org/calib/download/

Stumpf, A.J., and W.S. Dey, eds., 2012, Understanding the Mahomet aquifer: Geological, geophysical, and hydrogeological studies in Champaign County and adjacent areas: Illinois State Geological Survey, draft report to Illinois-American Water Company, contract no. 2007-02899, http://hdl.handle.net/2142/95787

Willman, H.B., and J.C. Frye, 1970, Pleistocene stratigraphy of Illinois: Illinois State Geological Survey, Bulletin 94, 204 p., https://archive.org/details/pleistocenestrat94will

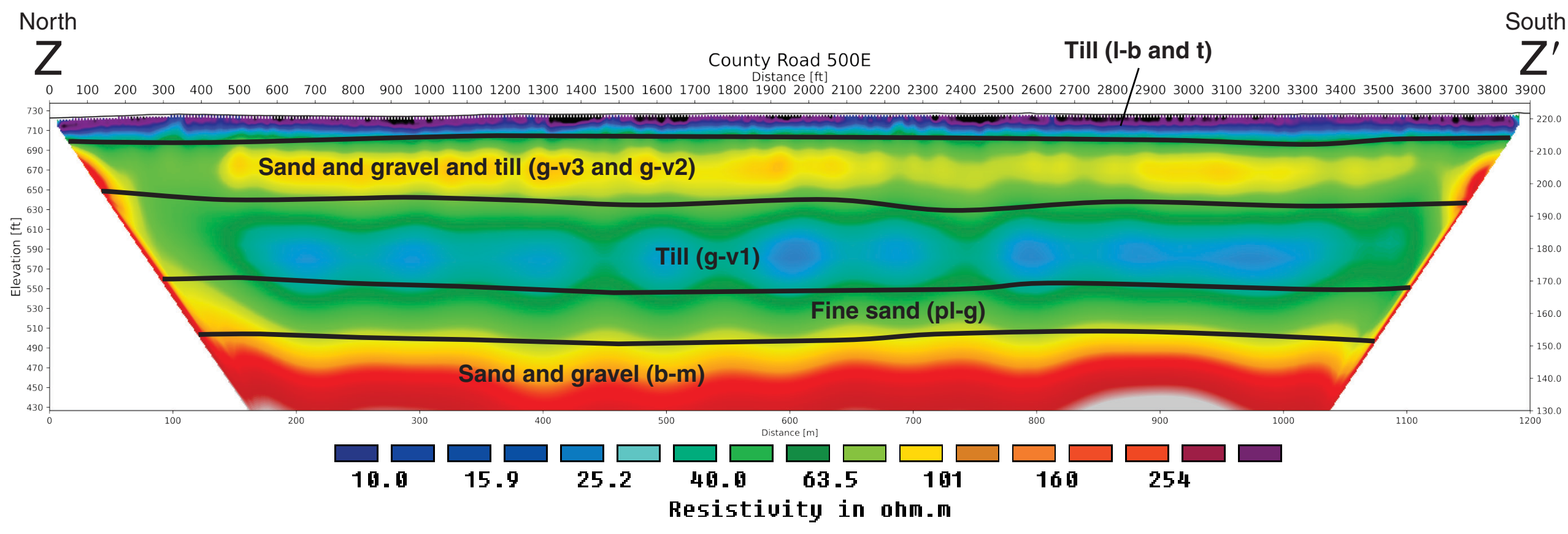
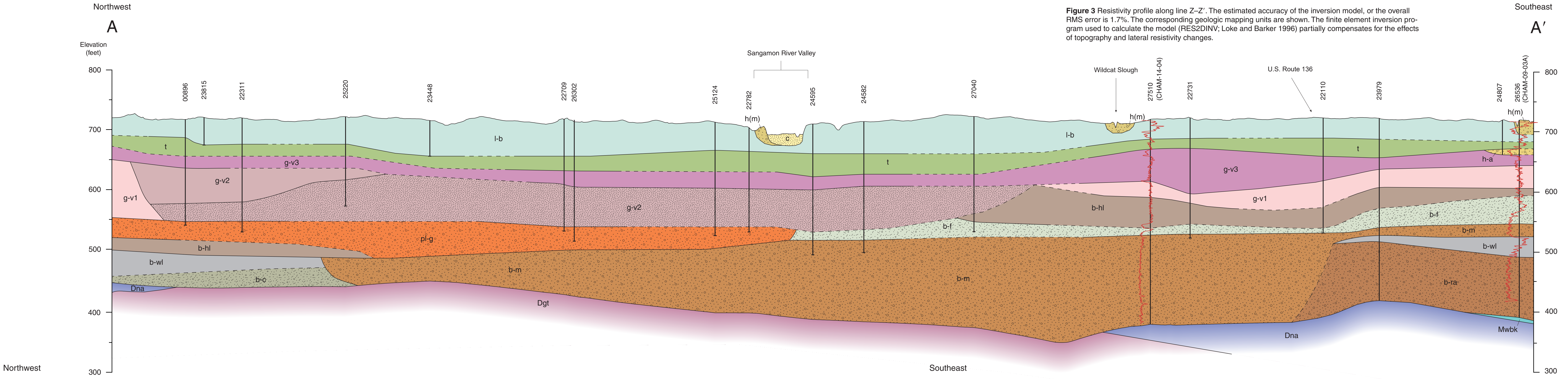
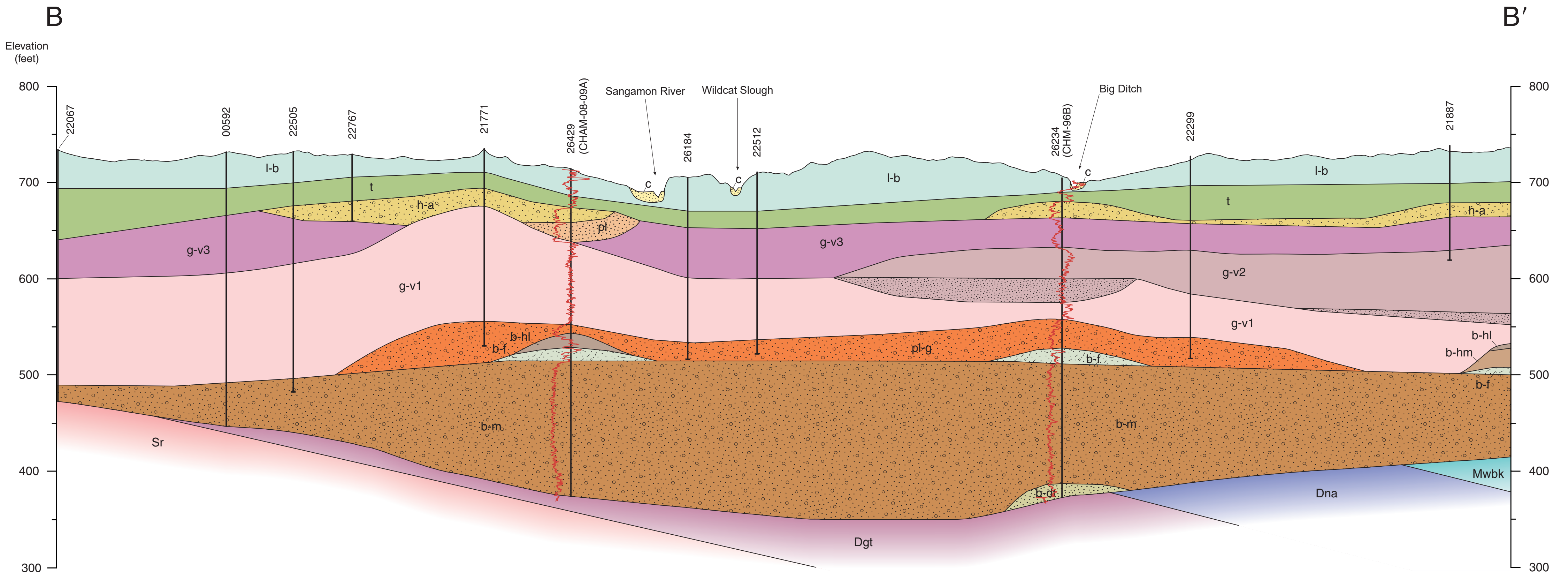


Figure 3 Resistivity profile along line Z–Z′. The estimated accuracy of the inversion model, or the overall RMS error is 1.7%. The corresponding geologic mapping units are shown. The finite element inversion program used to calculate the model (RES2DINV; Loke and Barker 1996) partially compensates for the effects of topography and lateral resistivity changes.





Cross Sections

⁘	Sand and gravel
⁘	Mainly sand; may contain some gravel or silt
⁘	Fine and very fine sand
⁘	Interstratified loamy sand, sand and gravel, silty and clay, and diamicton
☐	Diamicton, massive; loamy; stiff to hard
—	Contact
– – –	Inferred contact

Borehole Information

county identification number → 26429 (CHAM-08-09A) ← project site identification number

Log of natural gamma radiation measured in borehole

0 150 CPS

CPS = counts per second

Borehole

Note: Boring labels indicate the county identification number and field identification number (in parentheses). The county identification number is a portion of the 12-digit API number on file at the ISGS Geological Records Unit.

Horizontal scale: 1:24,000 (1 inch = 2,000 feet)
Vertical scale: 1 inch = 100 feet
Vertical exaggeration: 20×

QUATERNARY DEPOSITS

HUDSON EPISODE (~14,600 years before present (B.P.) to today)[1]

Description	Unit	Interpretation
Areas of disturbed or removed geologic materials; texture ranges from clay to gravel; may include waste or rubble	Disturbed Ground dg	**Deposits disturbed or modified by human activity** in borrow and gravel pits and made land
Sand, silt, clay, and gravel; massive to stratified; contains beds of organic material; poorly sorted; brown to gray; locally oxidized; calcareous; up to 20 feet thick	Cahokia Formation (undivided) c	**Alluvium (stream deposits)** mapped in floodplains along rivers, creeks and ditches.

WISCONSIN EPISODE (~55,000– ~23,000 years B.P.)[1]

Description	Unit	Interpretation
Sand and gravel; contains some beds of silt; well to poorly sorted; brown to yellowish brown; calcareous; up to 20 feet thick	Mackinaw Facies, Henry Formation h(m)	**Glaciofluvial sediment (outwash)** deposited by glacial meltwater in streams and rivers that drained the former ice sheets
Diamicton or sand, silt and clay; contains beds of sand, silt, and gravel; diamicton is sandy loam to silt loam; gray to grayish brown; calcareous; stiff to very stiff; up to 60 feet thick	Batestown Member, Lemont Formation l-b	**Till and ice-marginal sediment** forms end moraines (Rantoul Moraine) and ground moraine; includes interstratified sorted sediments
Diamicton; loam; grayish brown to reddish gray; calcareous; very stiff; 10 to 50 feet thick	Tiskilwa Formation (cross section only) t	**Till and ice-marginal sediment** derived directly from glacial ice; encountered in the subsurface only, underlying the Batestown Member
Sand and gravel with silt; pebbly and cobbly; well to poorly sorted; brown to grayish brown; calcareous; 10 to 20 feet thick	Ashmore Tongue, Henry Formation (cross section only) h-a	**Glaciofluvial sediment (outwash)** deposited by glacial meltwater in streams and rivers that flowed from an advancing Tiskilwa ice margin; not consistently differentiable from underlying deposits that are correlated to the Pearl and Glasford Formations

SANGAMON AND ILLINOIS EPISODES (~200,000–130,000 years B.P.)

Description	Unit	Interpretation
Fine to coarse sand with gravel; yellowish brown to grayish brown; calcite cemented in places; incised into the Vandalia Member; upper part weathered in profile of Sangamon Geosol; up to 50 feet thick	Pearl Formation (cross section only) pl	**Glaciofluvial sediment (outwash)** deposited by glacial meltwater in streams and rivers that flowed from former Vandalia ice margins
Diamicton, sand and gravel, and silt and clay; interstratified; includes sediments previously assigned to the Berry Clay, Radnor Member, Toulon Member, or Roby Silt; upper part weathered in profile of Sangamon Geosol; typically 40 to 80 feet thick	Vandalia Member, Glasford Formation upper unit (cross section only) g-v3	**Proglacial or ice-contact sediment** deposited by glacial meltwater or sediment gravity flows (debris flows) along or in front of former Vandalia ice margins
Diamicton, sand and gravel, and silt and clay; interstratified; includes basal deposit of sand and gravel; includes sediments previously assigned to the Berry Clay, Radnor Member, Toulon Member, or Roby Silt; typically 40 to 80 feet thick	Vandalia Member, Glasford Formation middle unit (cross section only) g-v2	**Subglacial or ice-contact sediments** derived directly from glacial ice or deposited by subglacial meltwater; it is interpreted that deposition occurred in an area of fast-flowing ice (possibly an ice stream), associated with the deglacial phase of the Illinois Episode glaciation
Diamicton; silt loam to loam; grayish brown; calcareous; contains beds of sand, silt, and gravel; hard; 20 to 110 feet thick	Vandalia Member, Glasford Formation lower unit (cross section only) g-v1	**Till and associated sediment** derived directly from glacial ice
Sand and gravel; pebbly; grayish brown; contains some beds of silt or diamicton; calcareous; well to moderately well sorted; 10 to 60 feet thick	Grigg tongue, Pearl Formation (cross section only) pl-g	**Glaciofluvial sediment (outwash)** deposited in front of advancing Vandalia ice margins, not consistently differentiable from underlying deposits of the Mahomet Sand Member where intervening tills are absent

PRE-ILLINOIS EPISODE (~1,200,000–430,000 years B.P.)[2]

Description	Unit	Interpretation
Diamicton; silt loam to loam; grayish brown; calcareous; hard upper part weathered in profile of Yarmouth Geosol; up to 15 feet thick	Tilton Member, Banner Formation (cross section only) b-tl	**Till and ice-marginal sediment** derived directly from glacial ice
Diamicton; loam; reddish brown to grayish brown; calcareous; contains beds of sand, silt, or gravel; hard; may contain material eroded from underlying deposits (e.g., wood and peat); upper part weathered in profile of Yarmouth Geosol; 5 to 30 feet thick	Hillery Member, Banner Formation (cross section only) b-hl	**Till and ice-marginal sediment** derived directly from glacial ice flowing into the area from a northern or northeast ice source
Diamicton; pebbly; loam to silt loam; olive brown to gray; calcareous; contains intraclasts or intervals of weathered silt loam and silty clay; up to 20 feet thick	Harmattan Member, Banner Formation (cross section only) b-hm	**Till and ice-marginal sediment** derived directly from glacial ice flowing into the area from a northern or northeast ice source
Sand, diamicton, and silt; sandy loam to silty clay loam; black to greenish gray; leached to weakly calcareous; hard; may contain peat, wood, and/or snail shells; 10 to 40 feet thick	Fisher member, Banner Formation (cross section only) b-f	**Fluvial or lacustrine sediment** deposited on a former floodplain of a river flowing in the Mahomet Bedrock Valley; the land surface was poorly drained and occasionally covered by overbank deposits or slopewash
Sand and gravel; brown to grayish brown; contains some beds of silt; calcareous; well to moderately well sorted; 20 to 175 feet thick	Mahomet Sand Member, Banner Formation (cross section only) b-m	**Glaciofluvial sediment (outwash)** deposited in the Mahomet Bedrock Valley by streams flowing in front of retreating ice margins
Diamicton; sandy loam to clay loam; brown to pinkish gray; calcareous; contains intervals of sand and gravel or silt and clay; hard; 20 to 50 feet thick	West Lebanon Member, Banner Formation (cross section only) b-wl	**Till and associated sediment** derived directly from glacial ice flowing into the area from an eastern ice source
Sand and gravel; pebbly to cobbly; brown; locally contains beds of silt or diamicton; calcareous; well to moderately well sorted; previously assigned to the lower unit of the Mahomet Sand Member; up to 100 feet thick	Rantoul member, Banner Formation (cross section only) b-ra	**Glaciofluvial sediment (outwash)** deposited in the Mahomet Bedrock Valley by streams flowing in front of advancing ice margins

PRE-ILLINOIS EPISODE (> ~1,200,000 years B.P)

Description	Unit	Interpretation
Sand with gravel; clayey in upper part; brown to dark gray; weakly calcareous to non-calcareous; contains beds of silt and clay; lower part pebbly to cobbly; contains a higher proportion of fragments of the local bedrock; 5 to 20 feet thick	Dewitt member, Banner Formation (cross section only) b-dt	**Fluvial sediment** deposited prior to the earliest pre-Illinois Episode glaciation; encountered in the deepest channel of the Mahomet Bedrock Valley
Diamicton, silt, clay, and sand and gravel; crudely stratified; olive brown; calcareous or non-calcareous; contains a higher proportion of fragments of the local bedrock; 10 to 40 feet thick	Canteen member, Banner Formation (cross section only) b-c	**Fluvial and lacustrine sediment, colluvium, or weathered bedrock** that accumulated on the landscape prior to the earliest pre-Illinois Episode glaciation

Paleozoic Bedrock[3]

Description	Unit	Interpretation
Argillaceous to silty limestone and dolomite that contours interbeds of shale and siltstone; white to light gray; light brown or greenish gray where glauconite is common and chert is plentiful that overlies light brownish gray silty shale and siltstone; dolomitic or calcareous; micaceous and glauconitic; up to 365 feet thick	Burlington, Keokuk, and Warsaw Formations (Mississippian Subsystem; cross section only) Mwbk	**Shallow marine carbonate** bank that is overlapped by deltaic strata
Comprises three shale members: 1) greenish-gray and olive-gray to dark gray shale, 2) middle dark gray to grayish and brownish black shale, and 3) upper greenish-gray and olive-gray to dark gray shale; 130 feet thick	New Albany Shale (Mississippian Subsystem; cross section only) Dna	**Deposited across a shelf-slope-basin transition** in a widespread inland sea centered in southeastern Illinois and adjacent western Kentucky; material was deposited in quiet waters; sea was probably deep in places
Largely limestone with some pure quartz sandstone, and dolomite; electric logs of the unit typically exhibit higher resistivity than the underlying Racine Dolomite; 50 to 100 feet thick	Grand Tower Limestone (Middle Devonian; cross section only) Dgt	**Deposits reflect sedimentation in seawater** of normal salinity and oxygen content in shallow subtidal to below fair-weather wave base environments
Dolomite; white to gray, olive, and brownish gray; varies from pure dolomite that is vuggy to very argillaceous and silty dolomite gradational to dolomitic shale and siltstone; 330 to 560 feet thick	Racine Dolomite (Silurian System; cross section only) Sr	**Reef and inter-reef facies** are distinguished

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[1] The time periods for the Wisconsin Episode and the Hudson Episode are reported as calibrated radiocarbon years and can be directly compared to calendar years before 1950 (Stuiver et al. 2020).

[2] The subdivision of sediments assigned to the pre-Illinois Episode is discussed in Stumpf and Dey (2012).

[3] Description of Paleozoic bedrock geology from Nelson (in prep.).