PRELIMINARY SURFICIAL GEOLOGY OF THE NEW SALEM QUADRANGLE, COWLEY COUNTY, KANSAS

by Jon J. Smith and John W. Dunham

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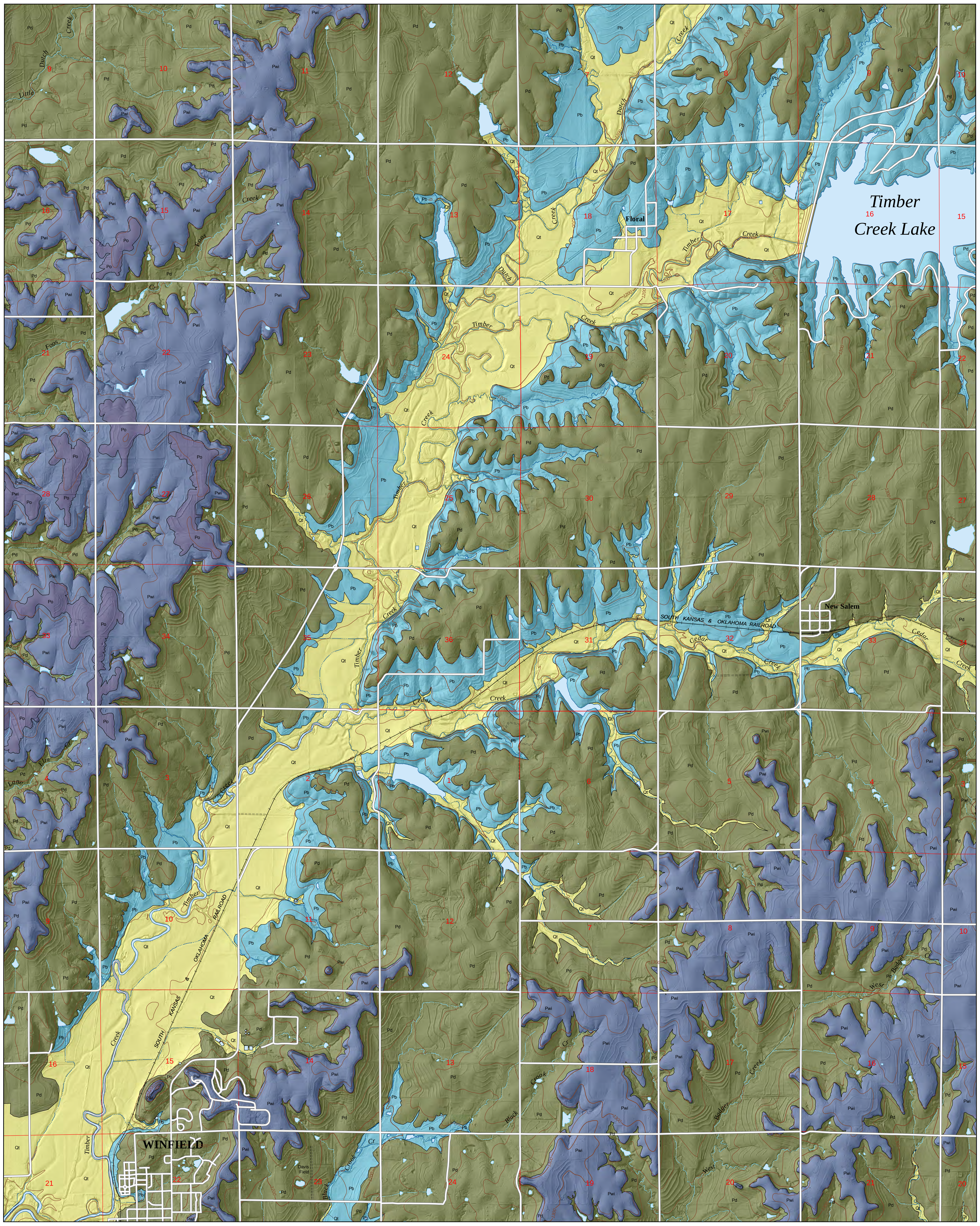


GEOLOGIC UNITS

CENOZOIC

Quaternary System
Pleistocene-Holocene

Qal

Undifferentiated floodplain alluvium—Relatively recent alluvial deposits make up the modern floodplain associated with the Arkansas River and numerous smaller streams and tributaries. Most channel systems, especially those with perennial flow, experienced entrenchment during the latest Holocene, with the Arkansas River and its two main tributaries actively undergoing floodplain redevelopment. Floodplain alluvium consists of silt, sand, and gravel, with only minute amounts of clay, exhibited primarily as slack water deposits. The alluvial deposits are relatively thin, probably not exceeding 20 ft (6 m) in thickness.

Qt

Alluvial terrace deposits—Terrace deposits are generally found adjacent to and slightly above modern floodplains of the Arkansas River and smaller streams and tributaries. The Arkansas River valley in Cowley County has a well-expressed broad terrace, primarily on the east side of the channel, and is traceable into upstream counties, where it has been radiocarbon and luminescence dated to a maximum age of 35,000 years ago, with younger ages from the late Holocene being derived in relatively close proximity to the modern channel. Terrace deposits of the Arkansas River consist primarily of silt, sand, and gravel and are exposed in multiple cut-bank exposures along the east side. Terrace deposits of the Walnut River, Grouse Creek, and their tributaries are finer grained (clay, silt, fine sand) as a result of originating in the Permian and Pennsylvanian shales. The thickest deposits of up to 70 ft (21 m) occur in the Arkansas River valley, but thicknesses range down to only a few feet in tributaries.

PALEOZOIC

Permian System
Wolfcampian Series

Po

Odell Shale—The Odell Shale is approximately 35 ft (11 m) thick and is composed of calcareous shale that is predominantly gray with dark blue-gray streaks. The Odell commonly underlies vegetation-covered slopes between the scarp-forming Winfield Limestone and the Herington Limestone Member of the Nolans Limestone.

Pwi

Winfield Limestone—The Winfield Limestone ranges up to 30 ft (9 m) in thickness and is composed of massive beds of light-blue to gray limestone with thin shale partings. The Winfield weathers white to light gray and forms steep outcrops. Though composed of three members elsewhere, only the uppermost Cresswell Limestone Member is recognized in Cowley County and the upper contact with the Odell Shale is nearly always covered.

Pd

Doyle Shale—The Doyle Shale is about 90 ft (27 m) at its thickest and is composed of, in ascending order, the Holmesville Shale Member, Towanda Limestone Member, and the Gage Shale Member. The Holmesville Shale is a 30 ft (9 m) thick greenish gray to red, unfossiliferous shale. The Towanda Limestone Member, averaging 10 ft (3 m) in thickness, is a resistant gray to yellow, brecciated limestone that often forms a bench between the lower Barneston and overlying Winfield formations. The Gage Shale Member is a red, green, and brown calcareous shale 45 ft (14 m) thick and characterized by a concretion zone and forming steep slopes below the overlying Winfield Limestone.

Pb

Barneston Limestone—The Barneston Limestone is about 80 ft (24 m) thick, thinning to the south in Cowley County, and buff to gray in color, with blue-gray chert occurring in the lower Florence Limestone Member. Echinoid and other fossils occur throughout, with fusulinids near the base. The middle Oketo Shale Member is generally absent in southeastern Kansas. The upper Fort Riley Limestone Member gradually transitions to the overlying Doyle Shale.

SOURCES

Bass, N. W., 1929, The geology of Cowley County, Kansas: Kansas Geological Survey, Bulletin 12, 203 p.

Bayne, C. K., 1960, Geology and ground-water resources of Harper County, Kansas: Kansas Geological Survey, Bulletin 143, 183 p.

Bayne, C. K., 1962, Geology and ground-water resources of Cowley County, Kansas. Kansas Geological Survey, Bulletin 158, 219 p.

Walters, K. L., 1961, Geology and ground-water resources of Sumner County, Kansas. Kansas Geological Survey, Bulletin 151, 198 p.

EXPLANATION

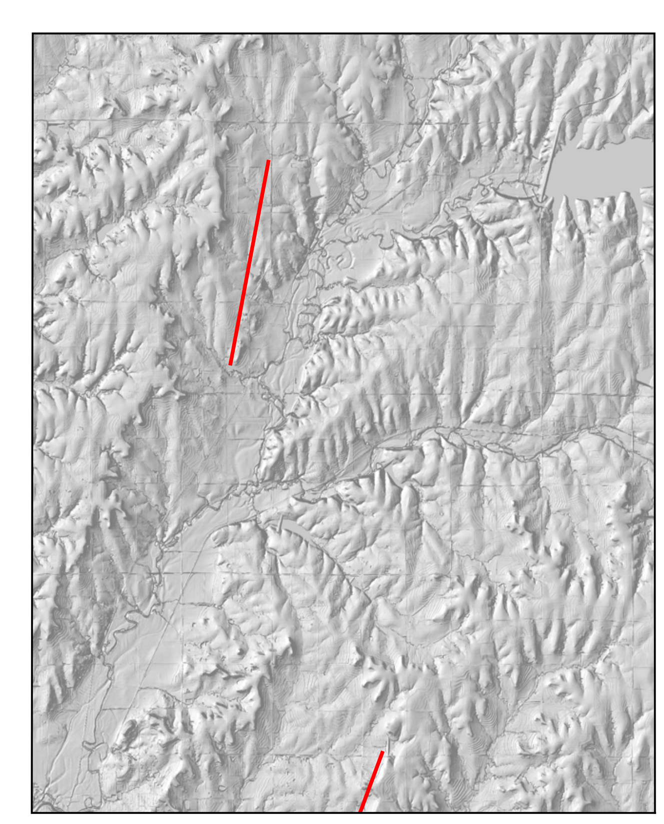
Boundaries and Locations
- Township/range line
- Section line

Transportation
- Local road
- Unimproved road
- Railroad
- Unpaved landing strip

Geologic Unit Boundaries
- Observed contact

Hydrology
- Perennial stream
- Intermittent stream
- Water body
- Water body - manmade shoreline

Topography
- 1200 Elevation contour (100-foot interval)
- Elevation contour (20-foot interval)
- Depression contour (20-foot interval)
- Depression contour (100-foot interval)



Inset showing mapped lineaments as potential surface expressions of structural features (e.g., faults, folds, joints, ridges). South-central Kansas, like other parts of the central and eastern United States, resides in a region of relatively low historical and instrumentally recorded seismicity. Despite this, the state has experienced approximately 3,500 earthquakes since 2013, with more than 130 of the events recorded as magnitude 3.0 or greater. This recent spate of seismicity raises concerns about the potential risk that structural features (faults, folds, joints, and ridges) may pose for moderate to large earthquakes. Investigations into the size or extent of these faults include mapping previously unrecognized surface features, such as lineaments, that may reflect more deeply seated structural features.

Lineaments were mapped using aerial photography and bare-earth LiDAR Digital Elevation Models (DEMs), based on one or more of the following criteria: (1) Visible offset in marker beds; (2) relatively low- to high-relief linear ridges that are not obvious geomorphic features due to erosion, slumping, subsidence, or dune formation; (3) linear ridges that cross drainage divides; (4) ridges that display curvilinear or backstepping (en echelon) configurations; (5) rectilinear or parallel drainage patterns; and (6) linear drainage patterns that align across drainage divides.

Elevation contours are presented for general reference. Used in the U.S. Geological Survey's current US Topo 1:24,000-scale topographic map series, they were generated from hydrographically improved 1/3 arc-second National Elevation Dataset (NED) data and smoothed during processing for use at 1:24,000 scale. In some places, the contours may be more generalized than the base data used for compilation of geologic outcrop patterns. Outcrop patterns on the map will typically reflect topographic variation more accurately than the associated contour lines. Repeated fluctuation of an outcrop line across a contour line should be interpreted as an indication that the mapped rock unit is maintaining a relatively constant elevation along a generalized contour.

1-meter LiDAR hillshades (2010 imagery), 1-meter U.S. Department of Agriculture – Farm Services Agency (USDA-FSA) National Agriculture Imagery Program (NAIP) digital imagery (2015 imagery), and 1-foot Kansas NG911 digital imagery were used as references in the digital mapping. USDA Natural Resources Conservation Service (NRCS) SSURGO data and other geologic maps and bulletins were used to supplement the mapping. Field mapping was undertaken from July to November 2019. Roads and highways are shown on the base map as represented by data from the U.S. Census Bureau. U.S. Department of Agriculture – Farm Services Agency (USDA-FSA) National Agriculture Imagery Program (NAIP) imagery also was used to check road locations.

Shaded relief is based on 1-meter hydroflattened bare-earth DEMs from the State of Kansas LiDAR Database. The DEM images, in ERDAS IMAGINE format, were mosaicked into a single output DEM, downsampled to 2-meter resolution, and reprojected to decimal degrees. The output DEM was then converted to a hillshade, a multidirectional shaded-relief image using angles of illumination from 0°, 225°, 270°, and 315° azimuths, each 45° above the horizon, with a 4x vertical exaggeration.

This geologic map was funded in part by the USGS National Cooperative Geologic Mapping Program, award number G19AC00231 (FY2019).

This map was produced using the ArcGIS system developed by Esri (Environmental Systems Research Institute, Inc.).

SUGGESTED REFERENCE TO THE MAP

Smith, J. J., and Dunham, J. W., 2020, Preliminary surficial geology of the New Salem quadrangle, Cowley County, Kansas: Kansas Geological Survey, Open-File Report 2020-11, scale 1:24,000, unpublished.

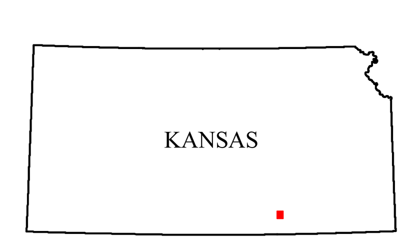
SCALE 1:24 000

KILOMETERS: 1 0.5 0 1 2
METERS: 1000 500 0 1000 2000
MILES: 1 0.5 0 1
FEET: 1000 500 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000

UNIVERSAL TRANSVERSE MERCATOR PROJECTION, ZONE 14
NORTH AMERICAN DATUM OF 1983

3°8'
TRUE NORTH
MAGNETIC NORTH

APPROXIMATE MEAN DECLINATION, 2020



QUADRANGLE LOCATION

Udall	Wilmot	Atlanta
Akron	New Salem	Burden
Hackney	Winfield	Eaton

ADJOINING 7.5' QUADRANGLES