

PRELIMINARY SURFICIAL GEOLOGY OF THE RICE COUNTY PORTION OF THE ALDEN NW QUADRANGLE, KANSAS

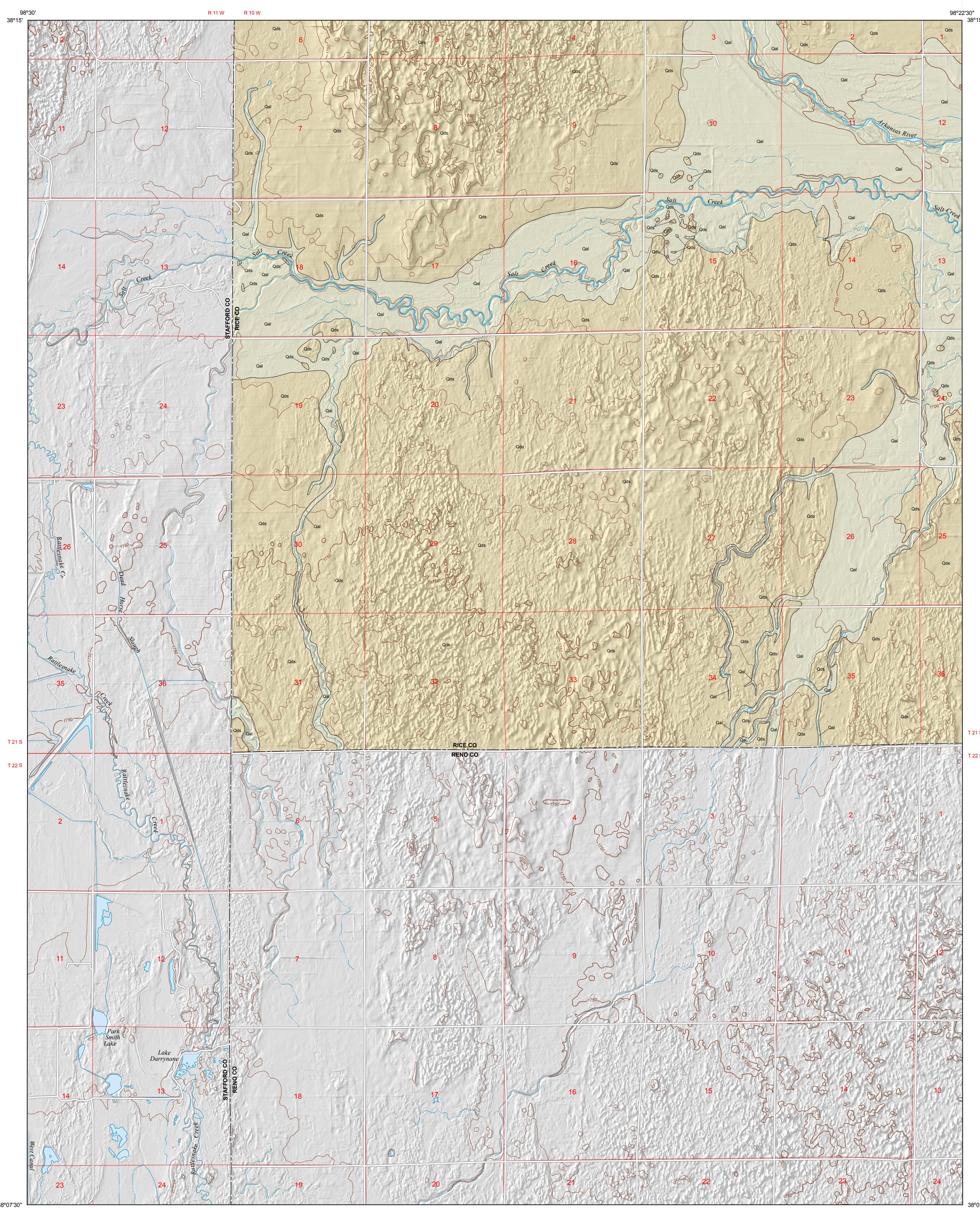
Geology by William C. Johnson and Aaron N. Koop
2015

Computer compilation and cartography by John W. Dunham, Hillary C. Crabb, and Aaron N. Koop



Open-file Report 2015-6

Funded in part by the
USGS National Cooperative
Geologic Mapping Program



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) digital elevation data (DEMs) for a 1:24,000 scale. Elevation contours are based on the geodetic datum used for 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-m LiDAR hillshades and 1-m 2010 and 2012 U.S. Department of Agriculture – Farm Services Agency (USDA-FSA) National Agriculture Imagery Program (NAIP) digital imagery were used as references in the digital mapping. USGS 7.5-min 1:24,000-scale topographic maps, USDA Natural Resources Conservation Service (NRCS) soil surveys, and other geologic maps and bulletins were used to supplement the mapping. Roads and highways are shown on the base map as represented by data from the Kansas Department of Transportation (KDOT), U.S. Census Bureau, and other sources. 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 5-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°, 22.5°, 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 G14AC00226 (FY2014).

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

This map is a preliminary product and has had less scientific and cartographic review than the Kansas Geological Survey's M-series geologic maps. KGS does not guarantee this map to be free from errors or inaccuracies and disclaims any responsibility or liability for interpretations made from the map or decisions based thereon.

SUGGESTED REFERENCE TO THE MAP

Johnson, W. C., and Koop, A. N., 2015, Preliminary surficial geology of the Rice County portion of the Alden NW quadrangle, Kansas: Kansas Geological Survey, Open-file Report 2015-6, scale 1:24,000, unpublished.

The following descriptions consist of a compilation of several sources including field notes and measured sections, data from shallow (<10 m) cores collected during the course of mapping, Kansas Department of Transportation geologic reports, USDA NRCS databases, and lithologic and other data in Bayne and Ward (1974).

GEOLOGIC UNITS

CENOZOIC

Quaternary System

Holocene

Floodplain alluvium — Floodplain deposits are associated with the Arkansas River and its tributaries and are Holocene in age. These deposits consist of clay, silt, sand, and gravel. In the Arkansas River sand-to-gravel size sediment consists to a large extent of material derived from the Rocky Mountains, particularly the Colorado Plateau (e.g., the Arkansas River, Limestone Creek, and Battlersnake Creek) while the finer sediment is derived primarily from local shale and sandstone, with the exception of Battlersnake Creek, which is dominated by sand-sized material derived from reworked Holocene sediments. Core data indicate that the thickness of the floodplain alluvium ranges from 0 to 45 ft (0-14 m) and averages about 25 ft (8 m).

Aeolian dune and sheet sand — Aeolian sand deposits occur in scattered bodies on the floodplain (Qal) and terrace (Qt) deposits. The dune sediments consist of moderately well-rounded quartz grains with lesser amounts of silt and clay. The primary source of the dune sediments is the Arkansas River channel. Luminescence dating of selected aeolian dunes running along the Arkansas River alluvium indicates that the dunes are between 22,000 to 230,000 years old, which are consistent with those reported from Reno County by Halffman et al. (2012). Arbogast (1998) reported an age range of 22,000 to 11,000 years ago for the sandy alluvium underlying the dunes and sand sheets in the Great Bend Sand Prairie, including southwestern Rice County. The dunes are stable with grass or crop cover except for a few isolated area where livestock and other disturbance have encouraged activation. Dune sand thickness is highly variable but ranges up to 50 ft (15 m). Pleistocene

CITED REFERENCE
Bayne, C. K., and Ward, J. R., 1974, Geology and hydrology of Rice County, central Kansas: Kansas Geological Survey, Bulletin 206, pt. 3, 17 p.

ADDITIONAL SOURCES

- Arbogast, A. F., 1998, Late Quaternary paleoenvironments and landscape evolution on the Great Bend Sand Prairie: Kansas Geological Survey, Bulletin 242, 74 p.
- Bayne, C. K., Franks, P. C., and Ives, William, Jr., 1971, Geology and ground-water resources of Ellsworth County, central Kansas: Kansas Geological Survey, Bulletin 201, 84 p.
- Fent, O. S., 1950, Geology and ground-water resources of Rice County, central Kansas: Kansas Geological Survey, Bulletin 85, 142 p.
- Halffman, A. F., Johnson, W. C., Hanson, P. R., Woodburn, T. L., Ludvigson, G. A., and Young, A. R., 2012, Activation history of the Hutchinson dunes in east-central Kansas, USA during the past 2200 years: Aeolian Research 5: 9-20.
- Plummer, N. V., and Romary, J. F., 1947, Kansas clay, Dakota Formation: Kansas Geological Survey, Bulletin 67, 241 p.

EXPLANATION

Boundaries and Locations

- County boundary
- Township/range line
- Section line

Transportation

- Local road

Geologic Unit Boundaries

- Observed contact

Hydrology and Topography

Streams

Water body

Elevation contour

(50-foot interval)

Elevation contour

(10-foot interval)

Depression contour

(50-foot interval)

Depression contour

(10-foot interval)

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20

RICE COUNTY QUADRANGLES

- | | |
|----------------|------------------|
| 1 Holymood | 11 Raymond |
| 2 Lorraine | 12 Chase |
| 3 Geneseo | 13 Lyons |
| 4 Crawford | 14 Lyons SE |
| 5 Langley | 15 Windom SW |
| 6 Chase NW | 16 Alden NW |
| 7 Chase NE | 17 Alden |
| 8 Lyons NW | 18 Sterling |
| 9 Little River | 19 Nickerson |
| 10 Windom | 20 Hutchinson NW |

