UNIVERSITY OF MINNESOTA
MINNESOTA GEOLOGICAL SURVEY
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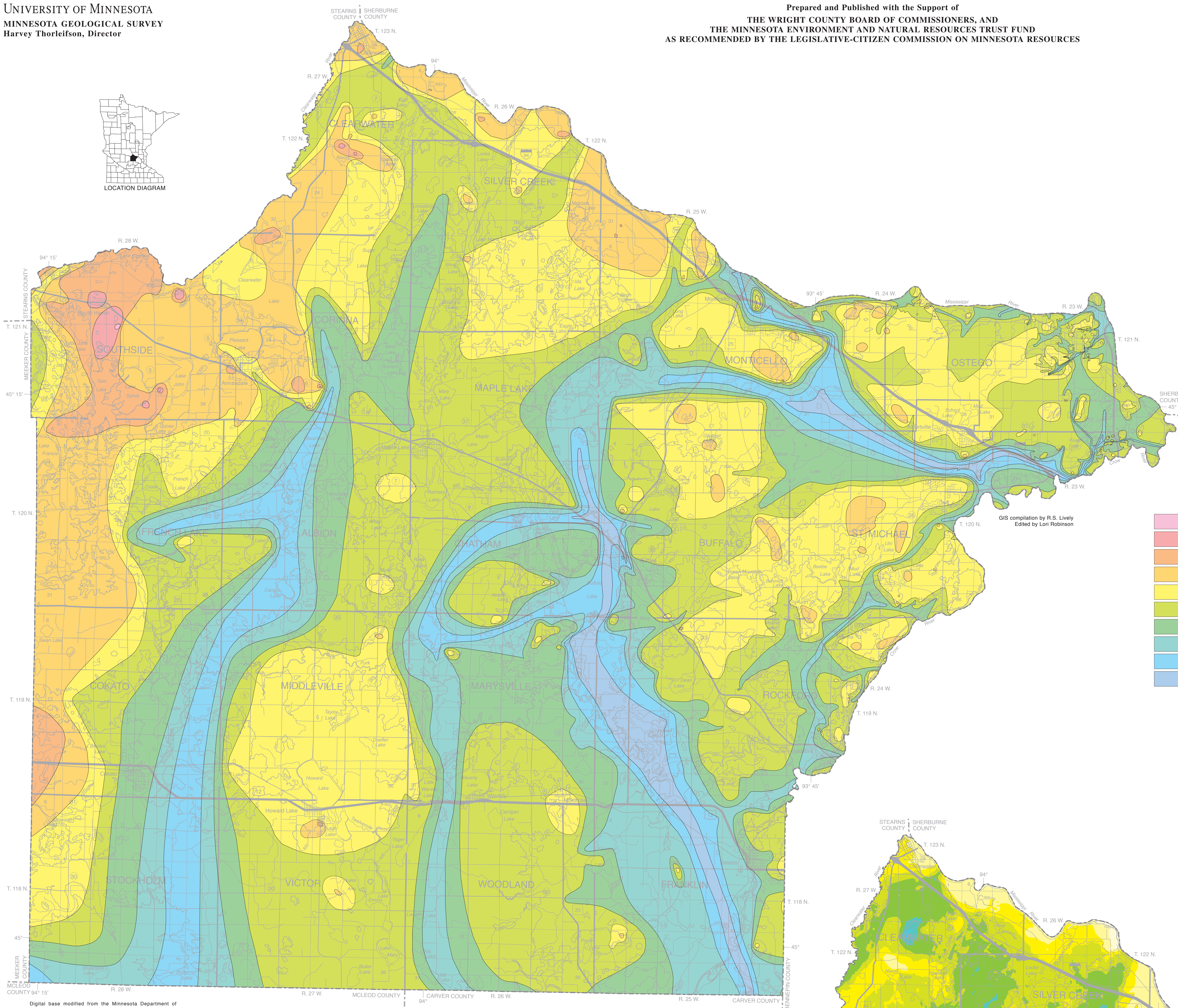
Prepared and Published with the Support of
THE WRIGHT COUNTY BOARD OF COMMISSIONERS, AND
THE MINNESOTA ENVIRONMENT AND NATURAL RESOURCES TRUST FUND
AS RECOMMENDED BY THE LEGISLATIVE-CITIZEN COMMISSION ON MINNESOTA RESOURCES

BEDROCK TOPOGRAPHY

By

Julia R. Steenberg
2013



Digital base modified from the Minnesota Department of Transportation BaseMap data; digital base annotation by the Minnesota Geological Survey.

Elevation contours were derived from the U.S. Geological Survey 30-meter Digital Elevation Model (DEM) by the Minnesota Geological Survey.

Universal Transverse Mercator Projection, grid zone 15
1983 North American Datum

SCALE 1:100 000
1 0 1 2 3 4 5 MILES
1 0 1 2 3 4 5 6 7 8 KILOMETERS
CONTOUR INTERVAL 20 METERS

GIS compilation by R.S. Lively
Edited by Lori Robinson

Elevation of the bedrock surface in feet above mean sea level

- 1,001-1,050
- 951-1,000
- 901-950
- 851-900
- 801-850
- 751-800
- 701-750
- 651-700
- 601-650
- 551-600

INTRODUCTION

The configuration of the elevation of the bedrock surface in Wright County is represented by the colors assigned to 50-foot (15-meter) elevation intervals (example: 751 to 800 feet above sea level) on the Bedrock Topography map. The position of the contour intervals was determined from records of water-well construction, scientific borings, and seismic soundings. The somewhat irregular distribution and density of data can be seen on Plate 1. This should be considered when assessing the reliability of the map at any particular location. Areas with a high density of bedrock control points are likely to have accurate interpretations of the bedrock elevation, whereas those areas with widely spaced control points may be less reliable and inappropriate for site-specific needs. Records of drill holes that intersect bedrock are most abundant in the eastern and northwestern parts of Wright County. Many are near urban areas that rely on ground water from bedrock aquifers. There are fewer wells that reach bedrock in the southwestern and central parts of the county because many of the domestic wells in those areas get sufficient water from sand and gravel beds in the glacial sediment.

The bedrock surface in Wright County varies from more than 1,000 feet (305 meters) above sea level in the northwestern part to less than 600 feet (198 meters) above sea level in buried valleys in the western and eastern parts. The most prominent features of the bedrock topography are buried valleys that deepen to the south and east. Based on recent mapping in surrounding areas (Mossler, 2009; Mossler and Chandler, 2009; Jirsa and others, 2011), the northernmost valley that deepens to the east continues eastward, crosses northern Hennepin County and southern Anoka County, curves south through Ramsey County, and enters the ancestral Mississippi River drainage network near St. Paul. The valley that deepens to the southeast likely continues south into Carver County before entering the ancestral Mississippi River drainage network near Shakopee. The major valley in the western part of the map that deepens to the south connects to valley systems in McLeod County that curve east through Carver County before also entering the ancestral Mississippi drainage network near Shakopee.

The present elevation of the bedrock surface is dependent upon several factors; the most important of which appears to have been the resistance of bedrock to weathering and erosion. As a result, the bedrock topography exhibits some correlation with rock units. Rock types that are most resistant to erosion typically occupy higher parts of the topography, and less resistant rock types are associated with low areas. Wright County is underlain by Mesozoic, Paleozoic, and Precambrian rocks. The Precambrian rocks are most resistant, forming isolated bedrock highs in the northwestern part of the map area. The Paleozoic rocks have flat uplands developed on moderately-cemented sandstones and siltstones of the Tunnel City Group, but are also dissected by narrow, steep sided valleys cut into less resistant formations such as the Wonewoc and Mt. Simon Sandstones. Scattered Mesozoic deposits consisting of siltstone, sandstone, and mudstone are also easily eroded and form wide and shallow valley systems in the southwestern part of the map area and broad topographic highs where the deposits have not been completely eroded.

REFERENCES

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Mossler, J.H., 2009, Bedrock topography, pl. 5 *of* Bauer, E.J., project manager, Geologic atlas of Carver County, Minnesota: Minnesota Geological Survey County Atlas C-21, 5 pls., scale 1:100,000.

Mossler, J.H., and Chandler, V.W., 2009, Bedrock topography, pl. 6 *of* Lusardi, B.A., project manager, Geologic atlas of McLeod County, Minnesota: Minnesota Geological Survey County Atlas C-20, 6 pls., scale 1:100,000.

DEPTH TO BEDROCK

By

Julia R. Steenberg
2013

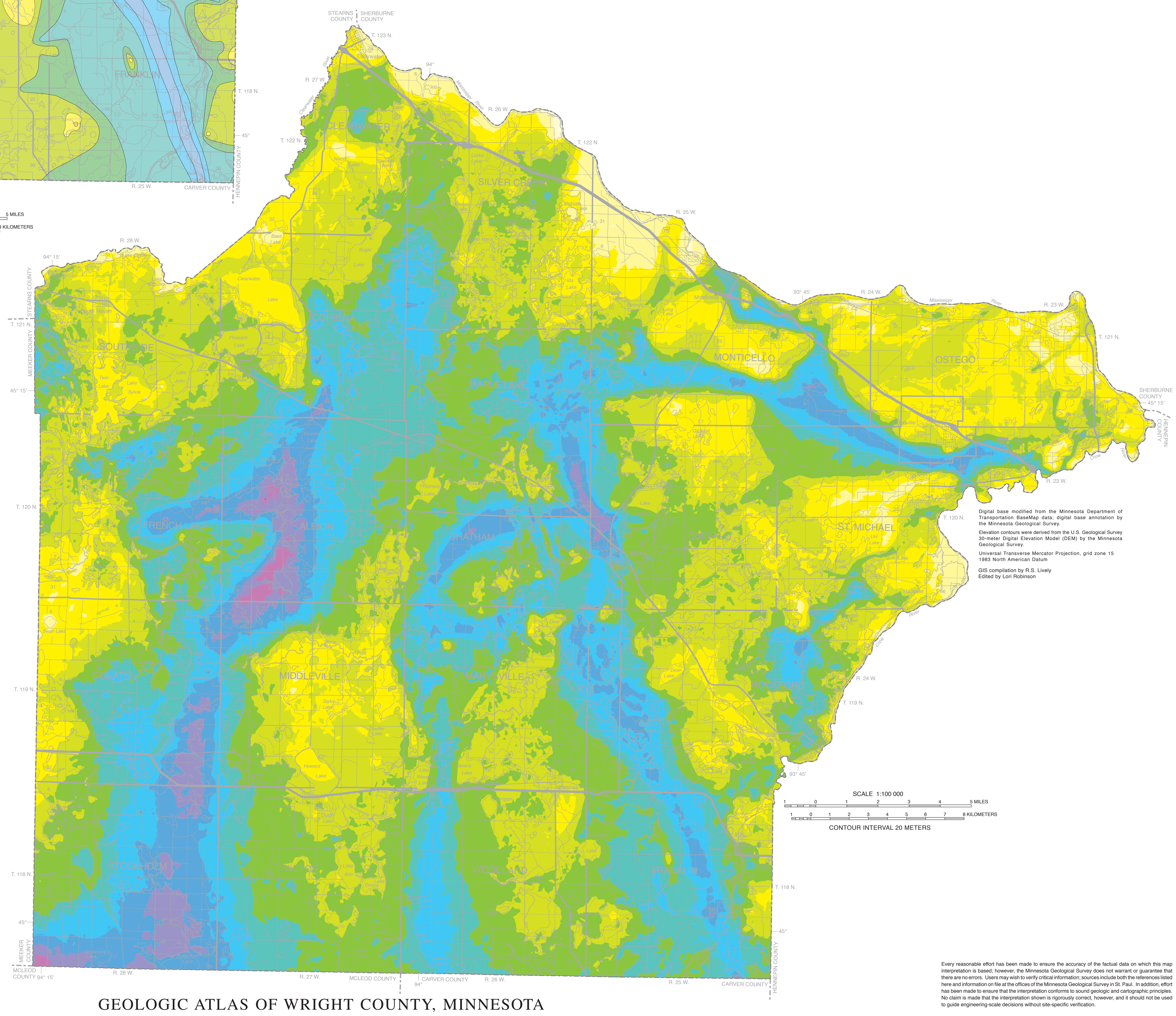
INTRODUCTION

The depth to bedrock is equal to the depth from the land surface to the bedrock surface. To calculate this thickness, a grid of bedrock-surface elevations was subtracted from a corresponding grid of land-surface elevations (30-meter cell size). The surface elevation grid was resampled from the National Elevation 10-meter data set of the U.S. Geological Survey, whereas the bedrock elevation grid was taken from the Bedrock Topography map, which was interpolated from interpretation of water well data. The residual grid was then classified at a 50-foot (15-meter) interval to produce the color-coded Depth to Bedrock map. Because the surface of a lake is regarded as the land surface elevation, the thickness of unconsolidated Quaternary sediments lying above the bedrock surface includes the depth of the lake water within lake boundaries. To calculate the true thickness of Quaternary sediments beneath the lake it is necessary to subtract the water depth at that location. In places the thickness of the unconsolidated Quaternary sediments varies greatly over short distances, and mapping at this scale (1:100,000) may not properly resolve such prominent variations. For that reason it is best to consult site-specific data, such as water well records and seismic soundings, wherever they are available.

The thickest sediments in Wright County occur over deep bedrock valleys, where several valleys have more than 450 feet (137 meters) of sediment overlying the bedrock. Areas where bedrock is at or within 50 feet (15 meters) of the land surface occur along the north and east sides of the perimeter of the county. The detailed appearance of the Depth to Bedrock map is related to surficial landforms because the land surface topography model is based on much more detail than the model of the bedrock surface.

Depth in feet from the land surface to the bedrock surface

- 1–50
- 51–100
- 101–150
- 151–200
- 201–250
- 251–300
- 301–350
- 351–400
- 401–450
- 451–500
- 501–550



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Every reasonable effort has been made to ensure the accuracy of the factual data on which this map interpretation is based; however, the Minnesota Geological Survey does not warrant or guarantee that there are no errors. Users may wish to verify critical information; sources include both the references listed here and information on file at the offices of the Minnesota Geological Survey in St. Paul. In addition, effort has been made to ensure that the interpretation conforms to sound geologic and cartographic principles. No claim is made that the interpretation shown is rigorously correct, however, and it should not be used to guide engineering-scale decisions without site-specific verification.