

THICKNESS OF QUATERNARY DEPOSITS OF TAZEWELL COUNTY, ILLINOIS

Patrick D. Johnstone

2003

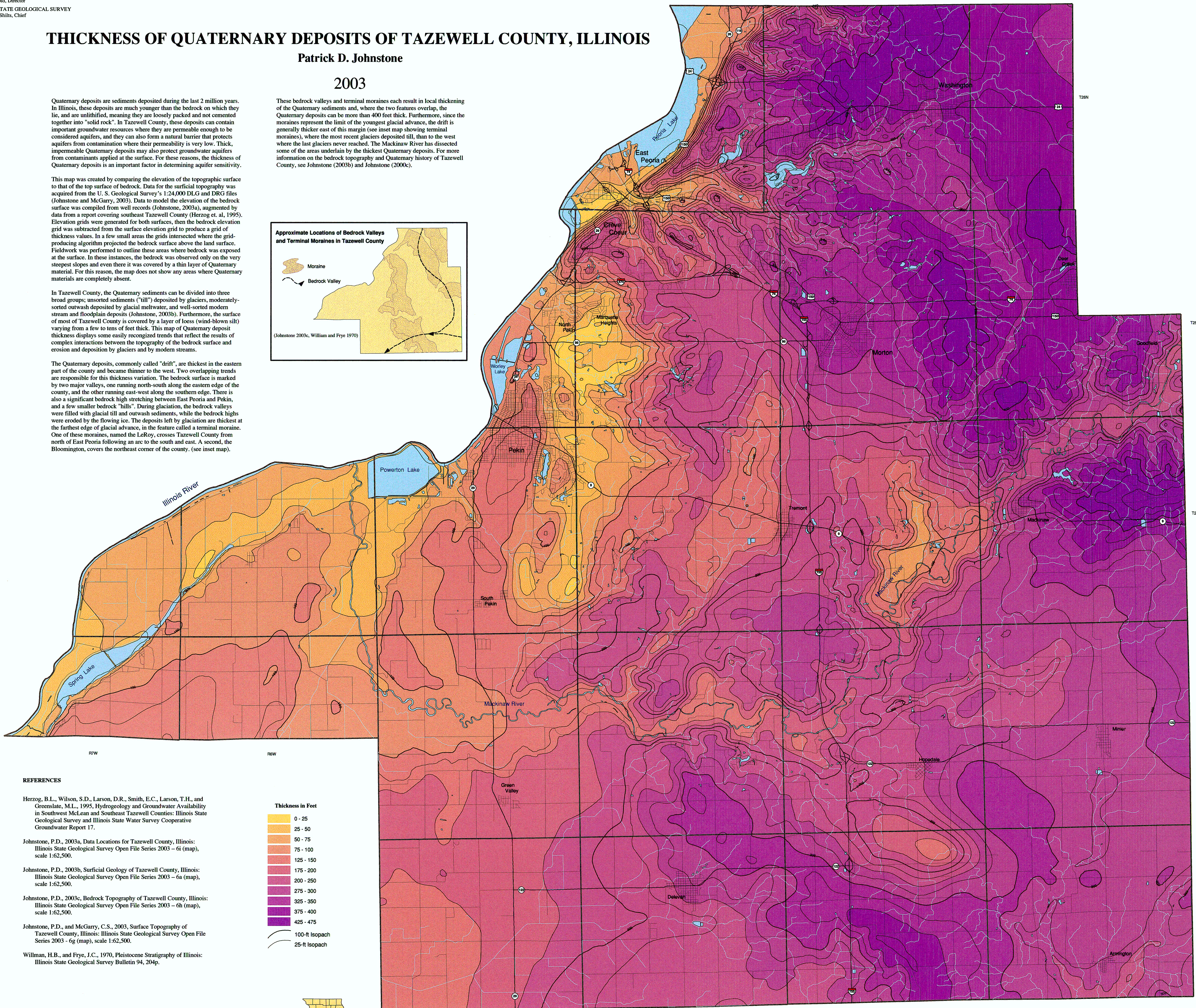
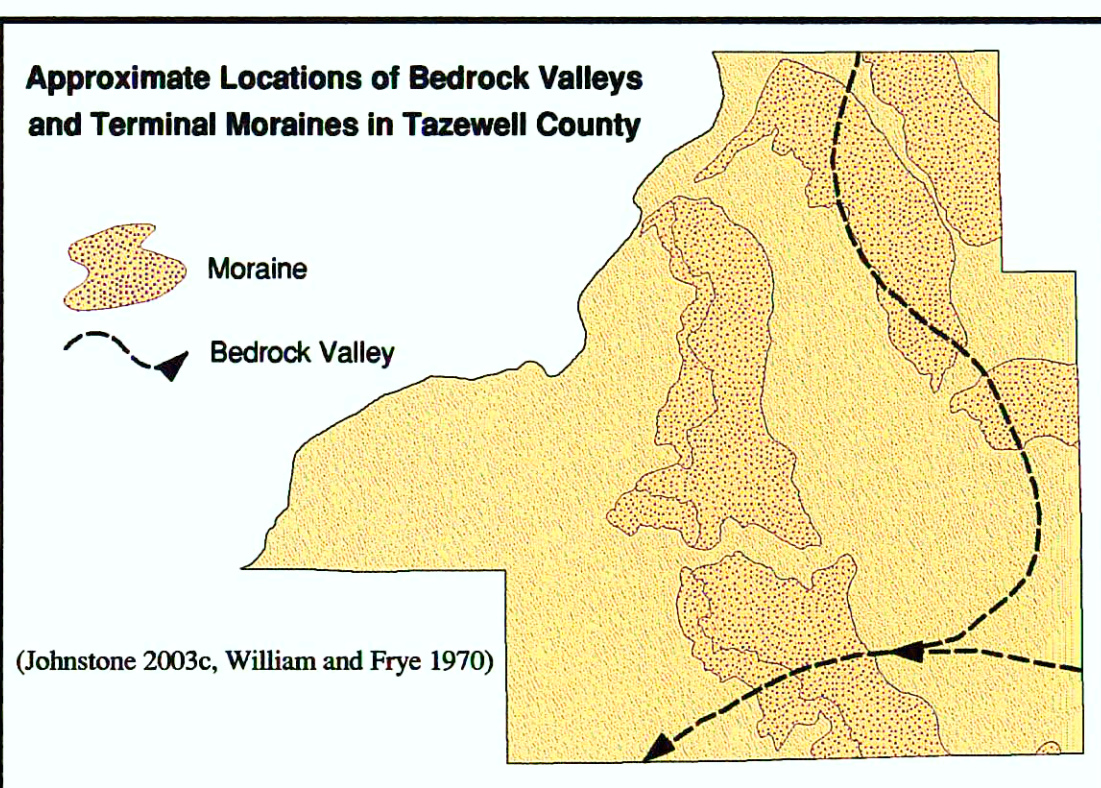
Quaternary deposits are sediments deposited during the last 2 million years. In Illinois, these deposits are much younger than the bedrock on which they lie, and are un lithified, meaning they are loosely packed and not cemented together into "solid rock". In Tazewell County, these deposits can contain important groundwater resources where they are permeable enough to be considered aquifers, and they can also form a natural barrier that protects aquifers from contamination where their permeability is very low. Thick, impermeable Quaternary deposits may also protect groundwater aquifers from contaminants applied at the surface. For these reasons, the thickness of Quaternary deposits is an important factor in determining aquifer sensitivity.

This map was created by comparing the elevation of the topographic surface to that of the top surface of bedrock. Data for the surficial topography was acquired from the U. S. Geological Survey's 1:24,000 DLG and DRG files (Johnstone and McGarry, 2003). Data to model the elevation of the bedrock surface was compiled from well records (Johnstone, 2003a), augmented by data from a report covering southeast Tazewell County (Herzog et al., 1995). Elevation grids were generated for both surfaces, then the bedrock elevation grid was subtracted from the surface elevation grid to produce a grid of thickness values. In a few small areas the grids intersected where the grid-producing algorithm projected the bedrock surface above the land surface. Fieldwork was performed to outline these areas where bedrock was exposed at the surface. In these instances, the bedrock was observed only on the very steepest slopes and even there it was covered by a thin layer of Quaternary material. For this reason, the map does not show any areas where Quaternary materials are completely absent.

In Tazewell County, the Quaternary sediments can be divided into three broad groups: unsorted sediments ("till") deposited by glaciers, moderately-sorted outwash deposited by glacial meltwater, and well-sorted modern stream and floodplain deposits (Johnstone, 2003b). Furthermore, the surface of most of Tazewell County is covered by a layer of loess (wind-blown silt) varying from a few to tens of feet thick. This map of Quaternary deposit thickness displays some easily recognized trends that reflect the results of complex interactions between the topography of the bedrock surface and erosion and deposition by glaciers and by modern streams.

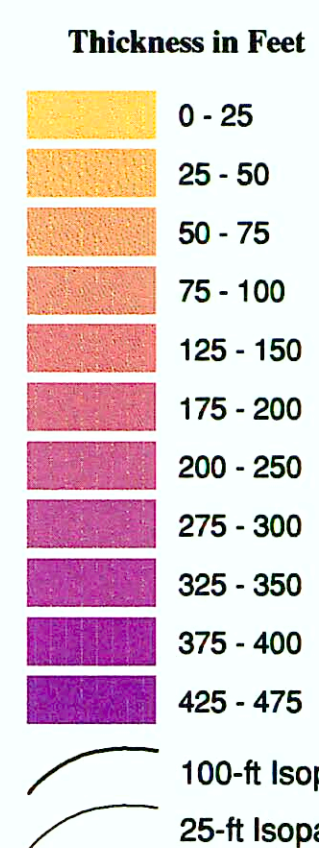
The Quaternary deposits, commonly called "drift", are thickest in the eastern part of the county and become thinner to the west. Two overlapping trends are responsible for this thickness variation. The bedrock surface is marked by two major valleys, one running north-south along the eastern edge of the county, and the other running east-west along the southern edge. There is also a significant bedrock high stretching between East Peoria and Pekin, and a few smaller bedrock "hills". During glaciation, the bedrock valleys were filled with glacial till and outwash sediments, while the bedrock highs were eroded by the flowing ice. The deposits left by glaciation are thickest at the farthest edge of glacial advance, in the feature called a terminal moraine. One of these moraines, named the LeRoy, crosses Tazewell County from north of East Peoria following an arc to the south and east. A second, the Bloomington, covers the northeast corner of the county. (see inset map).

These bedrock valleys and terminal moraines each result in local thickening of the Quaternary sediments and, where the two features overlap, the Quaternary deposits can be more than 400 feet thick. Furthermore, since the moraines represent the limit of the youngest glacial advance, the drift is generally thicker east of this margin (see inset map showing terminal moraines), where the most recent glaciers deposited till, than to the west where the last glaciers never reached. The Mackinaw River has dissected some of the areas underlain by the thickest Quaternary deposits. For more information on the bedrock topography and Quaternary history of Tazewell County, see Johnstone (2003b) and Johnstone (2000c).



REFERENCES

- Herzog, B.L., Wilson, S.D., Larson, D.R., Smith, E.C., Larson, T.H., and Greenslate, M.L., 1995, Hydrogeology and Groundwater Availability in Southwest McLean and Southeast Tazewell Counties: Illinois State Geological Survey and Illinois State Water Survey Cooperative Groundwater Report 17.
- Johnstone, P.D., 2003a, Data Locations for Tazewell County, Illinois: Illinois State Geological Survey Open File Series 2003 - 6i (map), scale 1:62,500.
- Johnstone, P.D., 2003b, Surficial Geology of Tazewell County, Illinois: Illinois State Geological Survey Open File Series 2003 - 6a (map), scale 1:62,500.
- Johnstone, P.D., 2003c, Bedrock Topography of Tazewell County, Illinois: Illinois State Geological Survey Open File Series 2003 - 6h (map), scale 1:62,500.
- Johnstone, P.D., and McGarry, C.S., 2003, Surface Topography of Tazewell County, Illinois: Illinois State Geological Survey Open File Series 2003 - 6g (map), scale 1:62,500.
- Willman, H.B., and Frye, J.C., 1970, Pleistocene Stratigraphy of Illinois: Illinois State Geological Survey Bulletin 94, 204p.

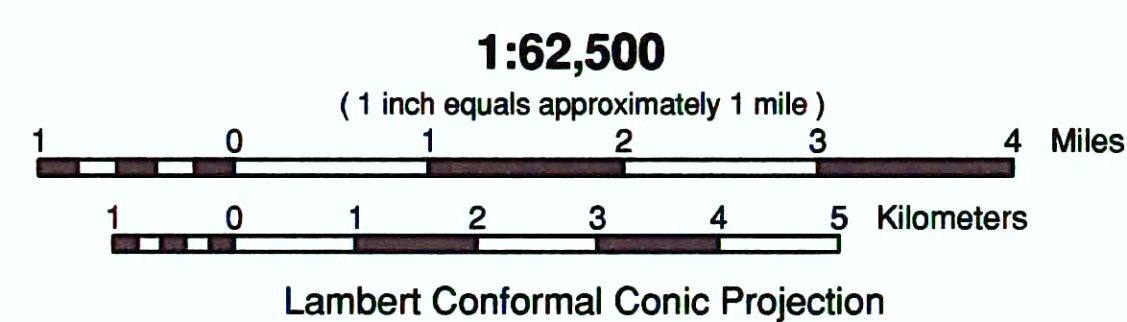
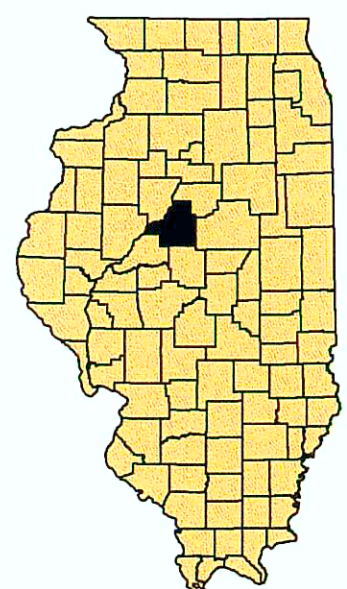


FOR ADDITIONAL INFORMATION CONTACT:

Illinois State Geological Survey
 Natural Resources Building
 615 East Peabody Drive
 Champaign, Illinois 61820

(217) 333-4747
<http://www.isgs.uiuc.edu>

Released by authority of the State of Illinois: 2003



This document has been carefully reviewed and edited and meets the scientific/technical standards of the Illinois State Geological Survey. It is suited to the purposes and uses intended by its authors and presents reasonable interpretations based on the data then available. The interpretations are based on data that may vary with respect to accuracy of geographic location, the type and quantity of data available at each location, and the scientific/technical qualifications of the data sources. This map is not meant to be enlarged. Enlarging the scale of a published map or cross section, by whatever means, does not increase the inherent accuracy of the information and scientific interpretations it portrays.

This document provides a conceptual model of the geology of the area on which further work can be based. This large-scale (1:62,500-scale) map shown herein may be used to screen the region for potentially suitable sites for a variety of purposes, but use of this document for such screening does not eliminate the need for detailed studies to fully understand the geology of a specific site. The Illinois State Geological Survey, the Illinois Department of Natural Resources, and the State 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.