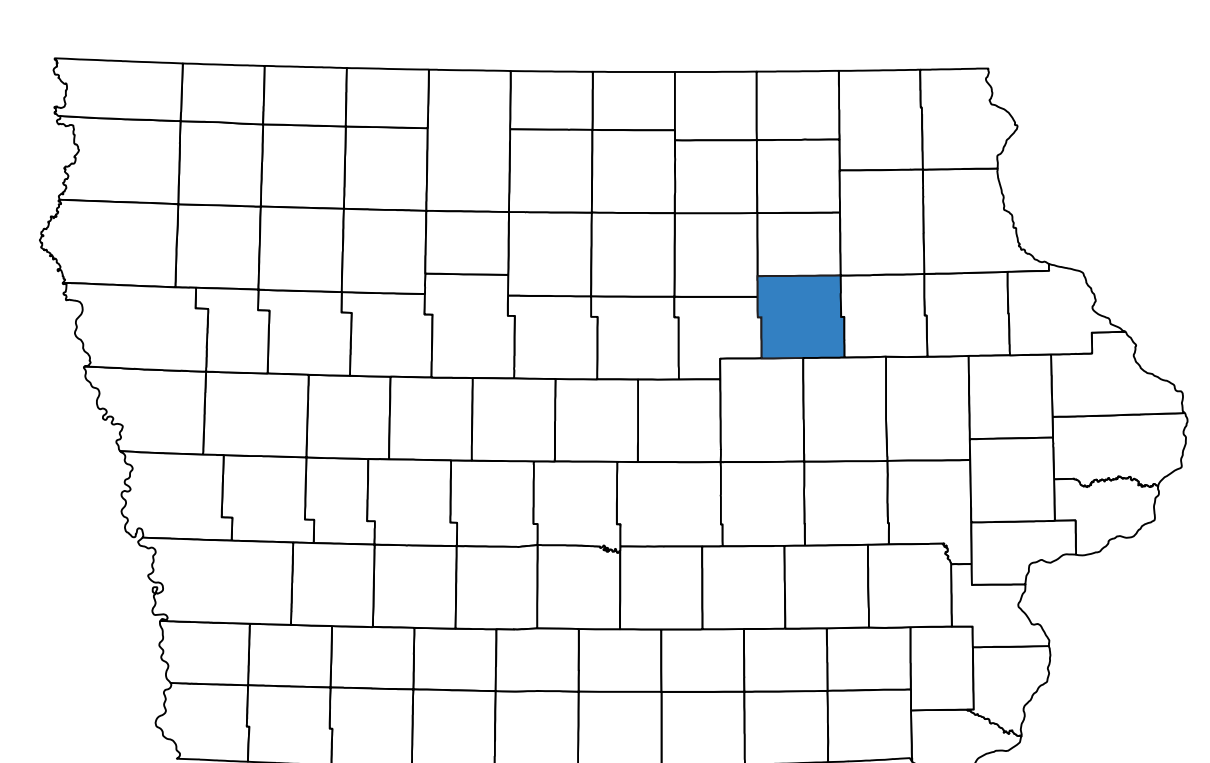
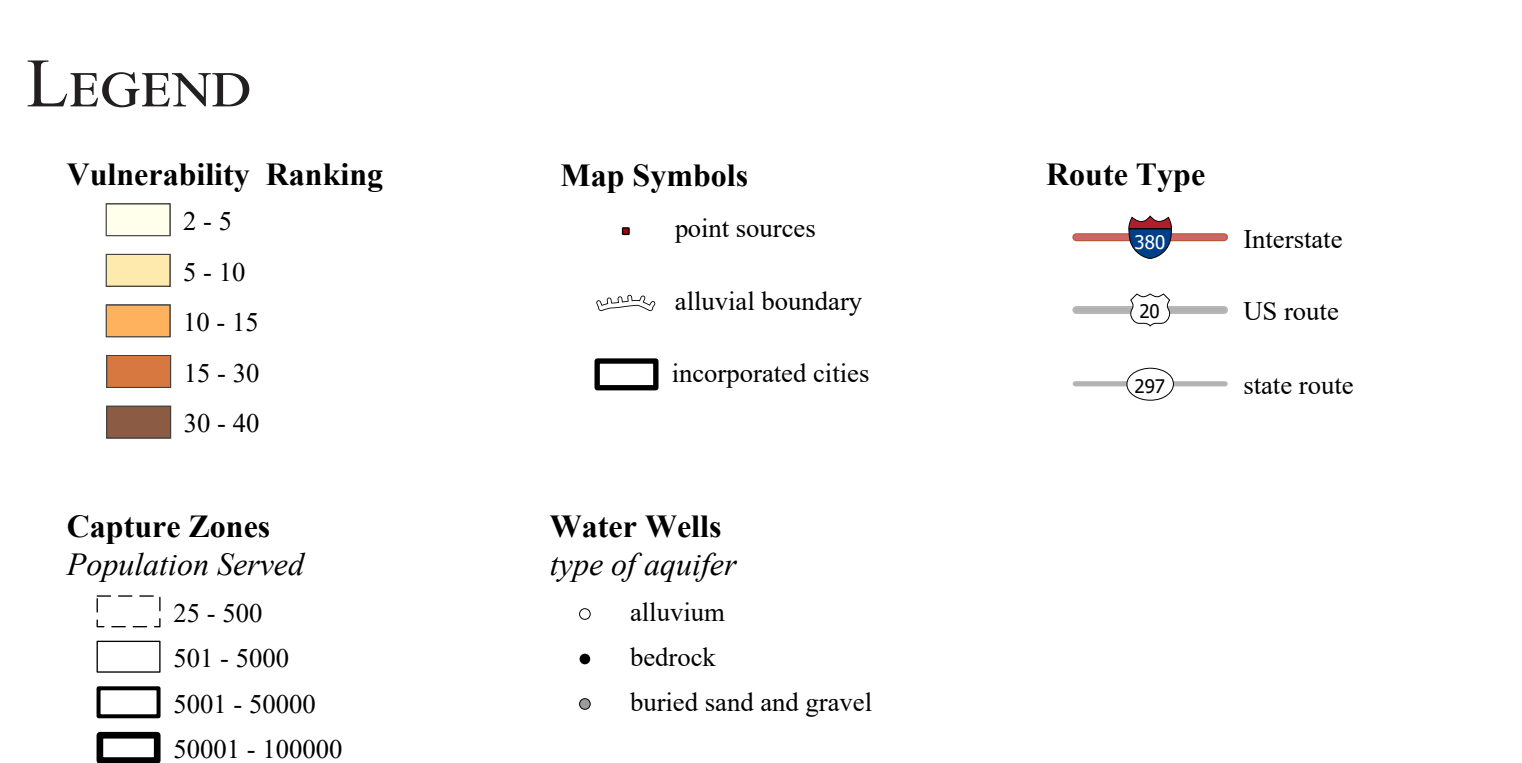
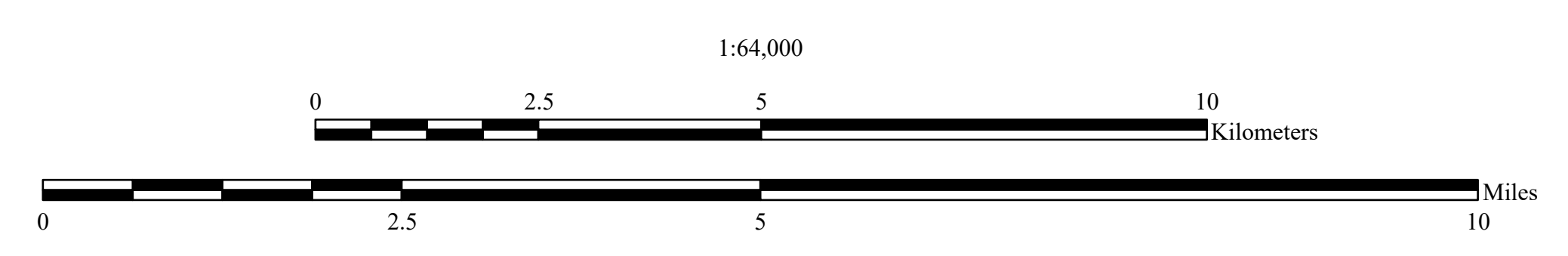
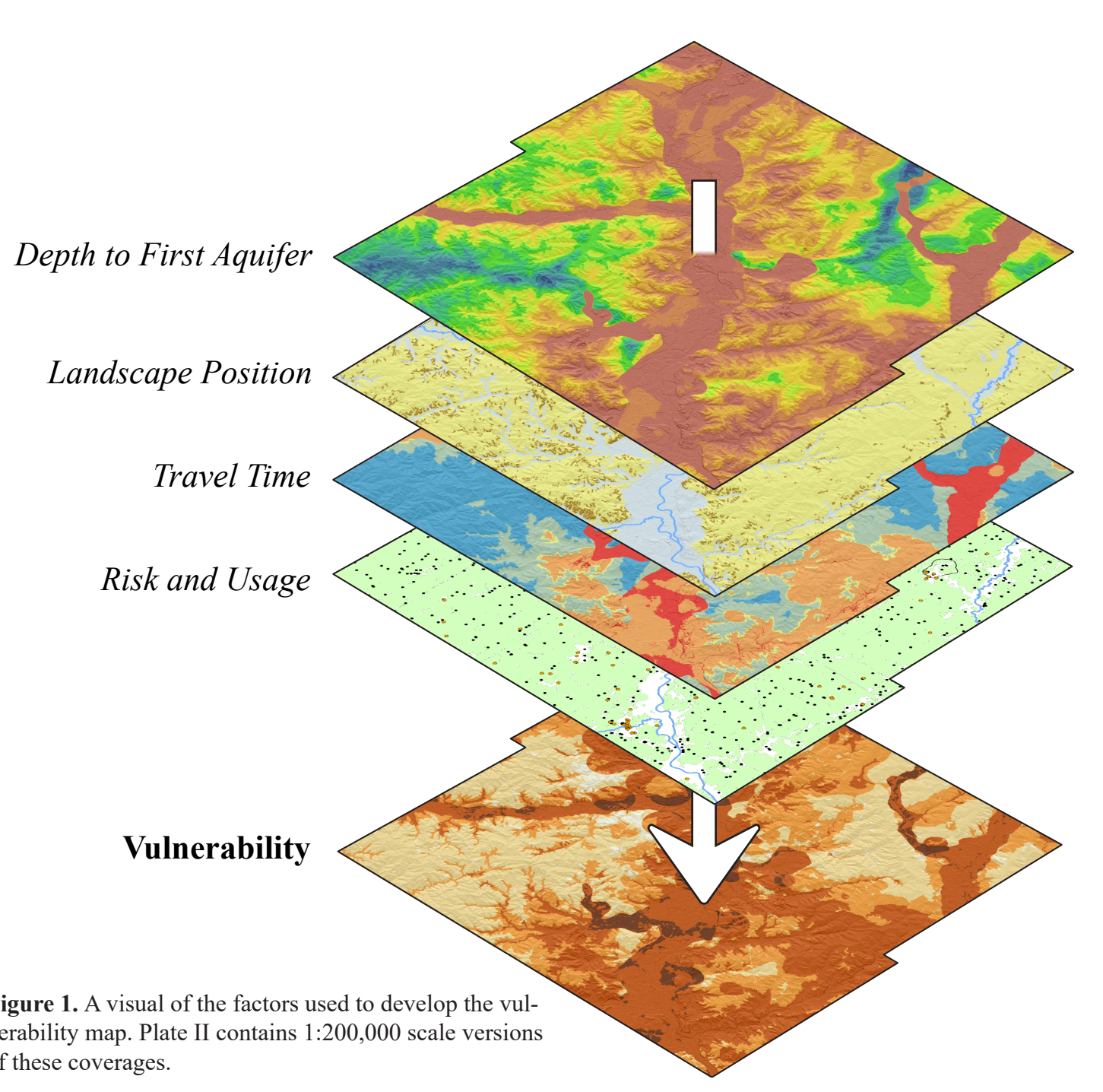
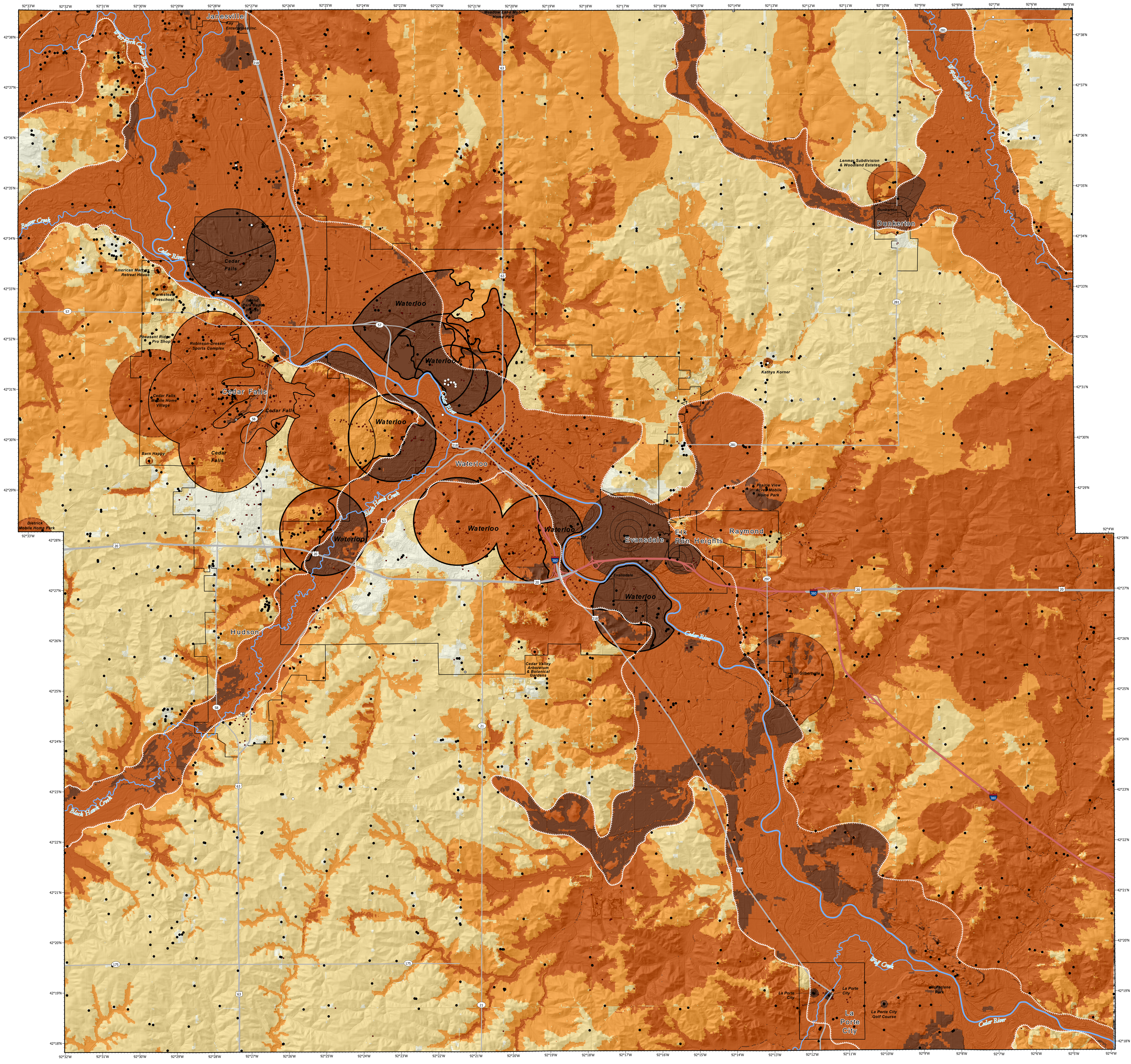


VULNERABILITY RANK OF THE FIRST ENCOUNTERED AQUIFER IN BLACK HAWK COUNTY, IOWA

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INTRODUCTION

Black Hawk County lies within the Iowan Erosion Surface (IES) landform region in northeast Iowa. This area consists primarily of Devonian and Silurian carbonate bedrock that has been covered by Quaternary sediments. The IES has been glaciated multiple times and was subsequently exposed to a period of extensive weathering and colluviation that mantled the upland landscape with unworked periglacial sediments. The Cedar and Wapsipicon river valleys are filled with glacially derived Wisconsin-age sand and gravels as well as younger Holocene finer-grained alluvial deposits.

Due to the presence of multiple aquifer bodies, and the potential for surface nonpoint and point contamination, the IGS completed an aquifer vulnerability assessment for Black Hawk County. Previous mapping of the surficial (Tassier-Surine et al., 2013) and bedrock (Rowden et al., 2013) geology of the county, as well as a revision of the bedrock topography during 2023, created the necessary framework to complete a vulnerability map. This geologic information was combined with existing geospatial data and previous hydrogeologic research to assess the vulnerability and risk of aquifers to contamination. The aquifer vulnerability map included four main geospatial layers that were compiled at a 30m resolution in the county and consisted of 1) groundwater recharge; 2) groundwater travel time to the uppermost aquifer; 3) contaminant risk from point and nonpoint sources; and 4) groundwater use components.

The scores for the four factors (recharge, time of travel, risk and use) were added together within a 30m grid cell to establish an aquifer vulnerability index (AVI) to calculate a score ranging from 0 (lowest risk) to 50 (highest risk). The aquifer vulnerability map for Black Hawk County shows increased vulnerability for many regions within the Cedar River floodplain where there is greater recharge, fast vertical groundwater travel times, the presence of point or nonpoint risks and their location within a known capture zone. In contrast, other regions of the county underlain by unoxidized till are largely protected from groundwater risks. Overall, the aquifer vulnerability map for Black Hawk County shows that vulnerabilities within the county are not evenly distributed and that some areas have greater potential for impacts than others.

REFERENCES

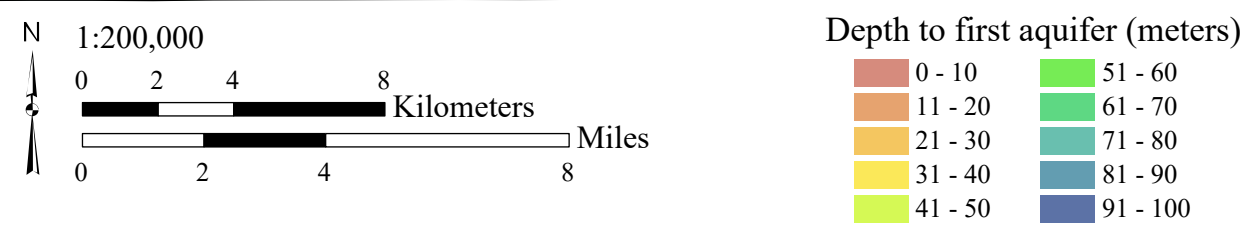
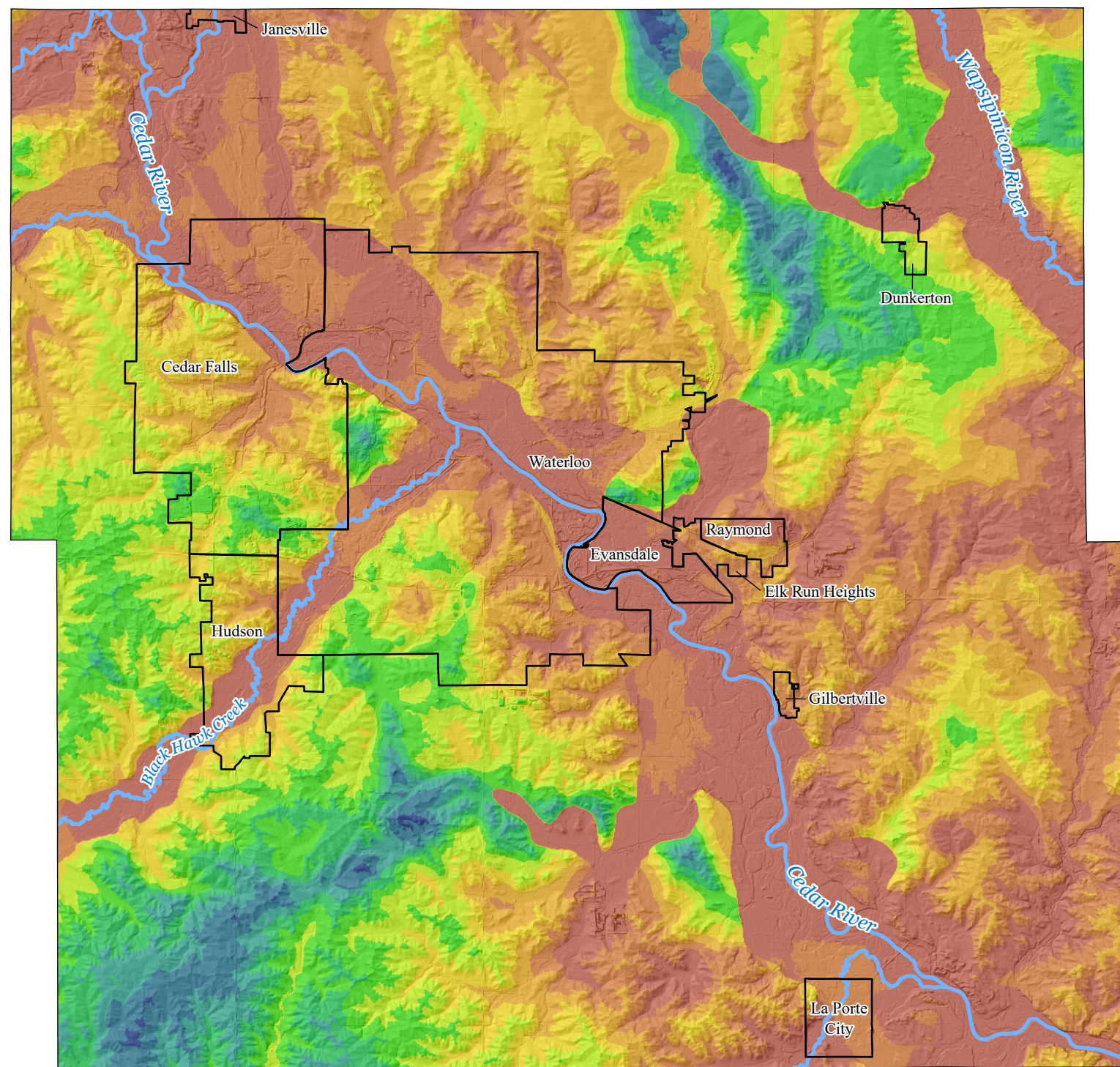
Rowden, R., McKay, R., Liu, H., Quade, D., Tassier-Surine, S., and Gagliano, J. 2013. Bedrock geology of Black Hawk County, Iowa. Iowa Geological Survey Publication OFM-13-3.
Tassier-Surine, S., Quade, D., Rowden, R., McKay, R., Liu, H., and Gagliano, J. 2013. Surficial geology of Black Hawk County, Iowa. Iowa Geological Survey Publication OFM-13-4.

Figure 1. A visual of the factors used to develop the vulnerability map. Plate II contains 1:200,000 scale versions of these coverages.

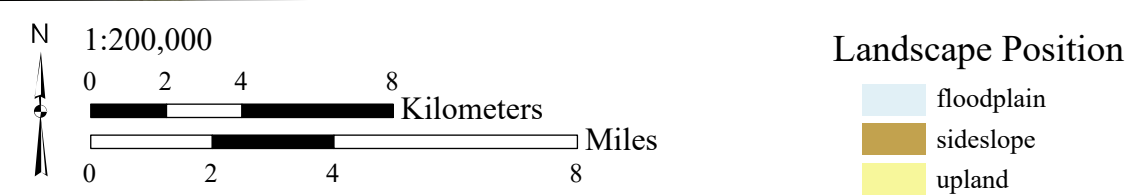
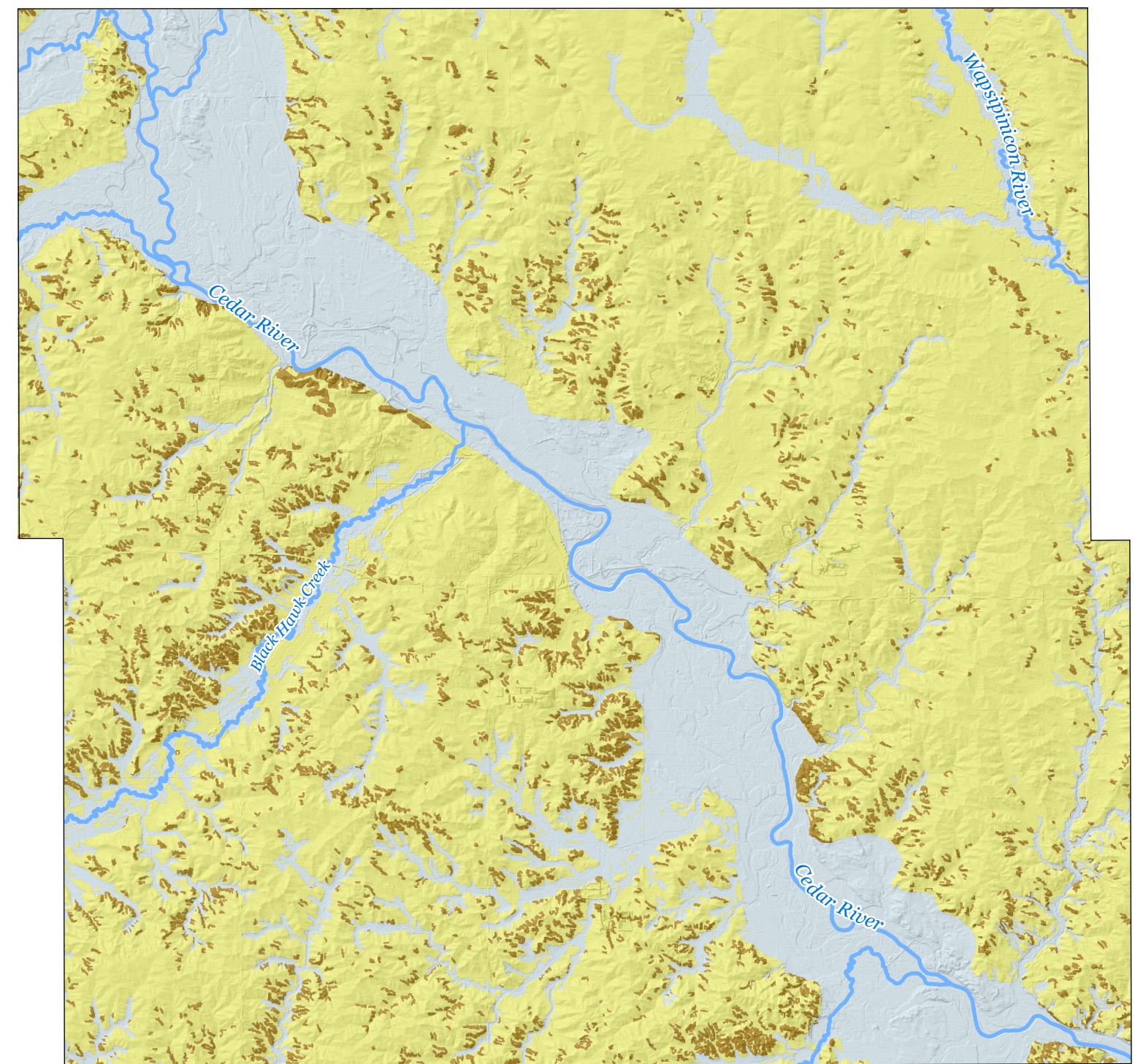
Figure 2. The location of Black Hawk County in Iowa.

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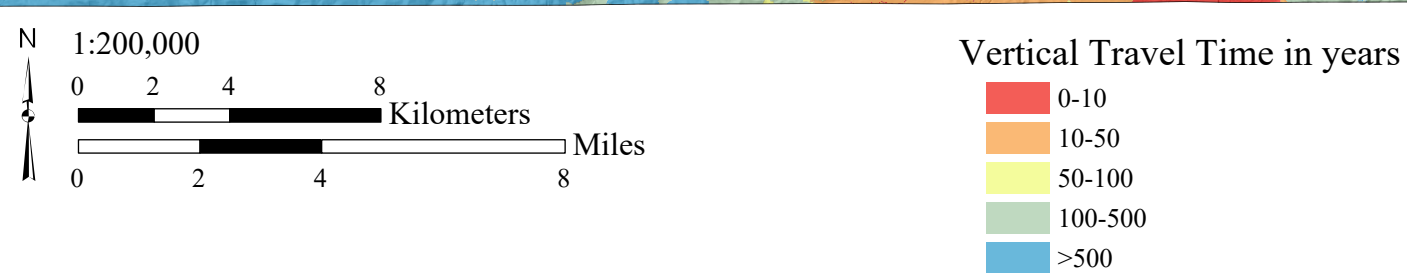
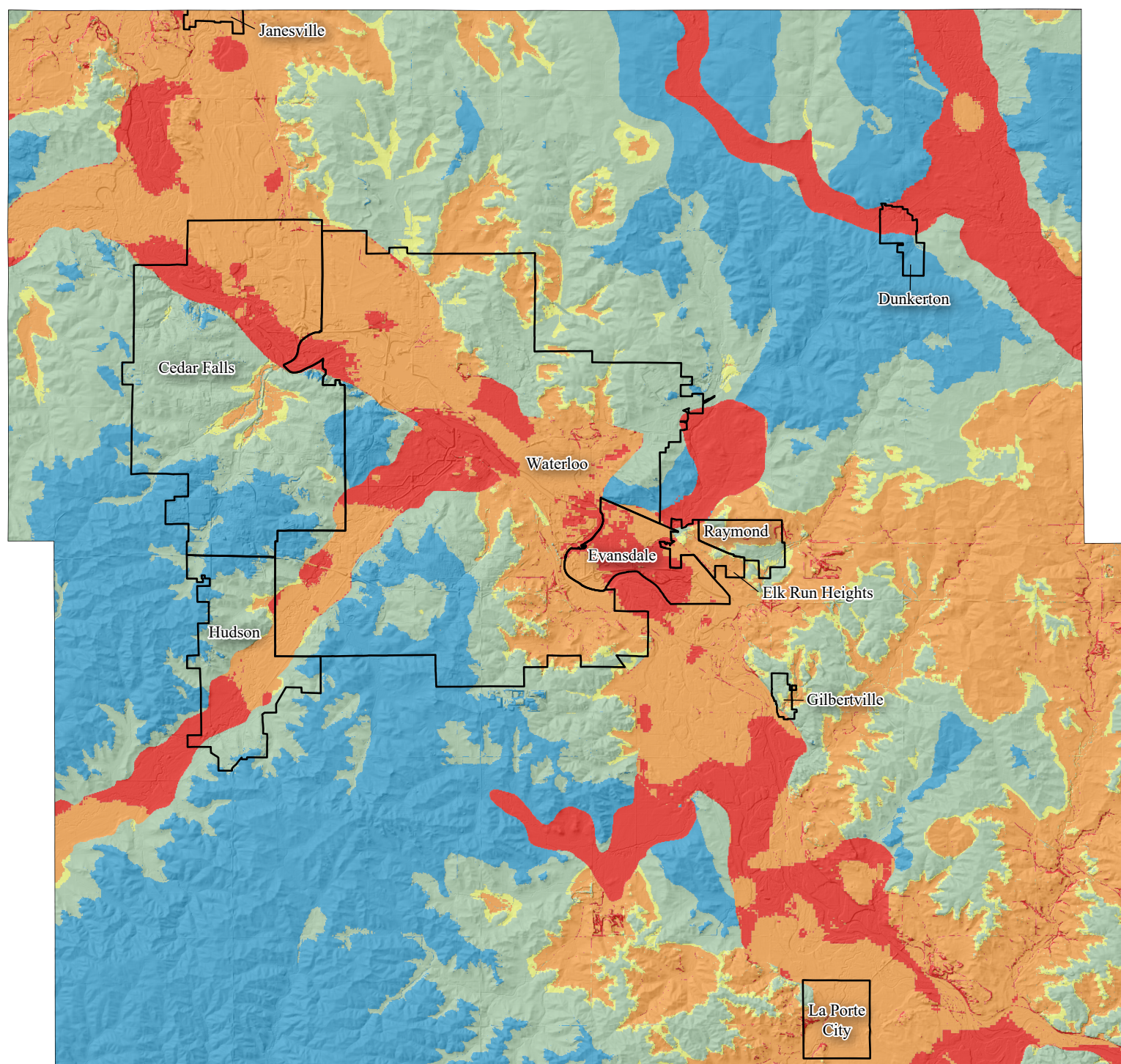
DEPTH TO FIRST AQUIFER



LANDSCAPE POSITION



TRAVEL TIME



RISK AND USAGE

