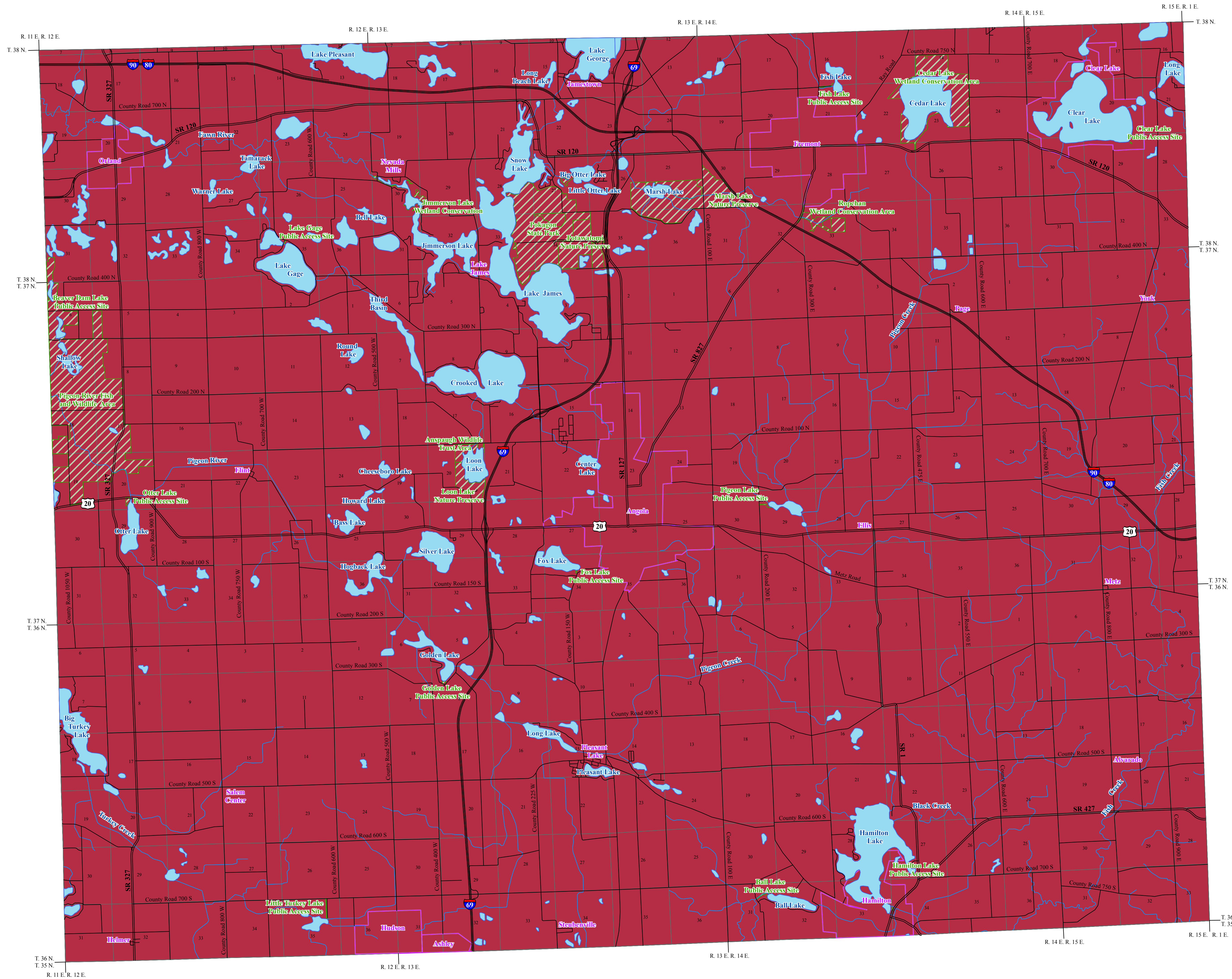


BEDROCK AQUIFER SYSTEMS OF STEUBEN COUNTY, INDIANA



The occurrence of bedrock aquifers depends on the original composition of the geologic material and subsequent changes which influence the hydraulic properties. Post-depositional processes, which promote jointing, fracturing, and solution activity of exposed bedrock, generally increase the hydraulic conductivity (permeability) of the upper portion of bedrock aquifer systems. Because permeability in many places is greatest near the bedrock surface, bedrock units within the upper 100 feet are commonly the most productive aquifers.

The yield of a bedrock aquifer depends on its hydraulic characteristics and the nature of the overlying deposits. Shale and glacial till act as aquitards, restricting recharge to underlying bedrock aquifers. However, fracturing and/or jointing may occur in aquitards, which can increase recharge to the underlying aquifers. In general, hydraulic properties of bedrock aquifers are highly variable. Most bedrock aquifers overlie by thick glacial deposits, such as in Steuben County, are under confined conditions. In other words, the potentiometric surface (water level) in most wells completed in bedrock rises above the top of the water-bearing zone.

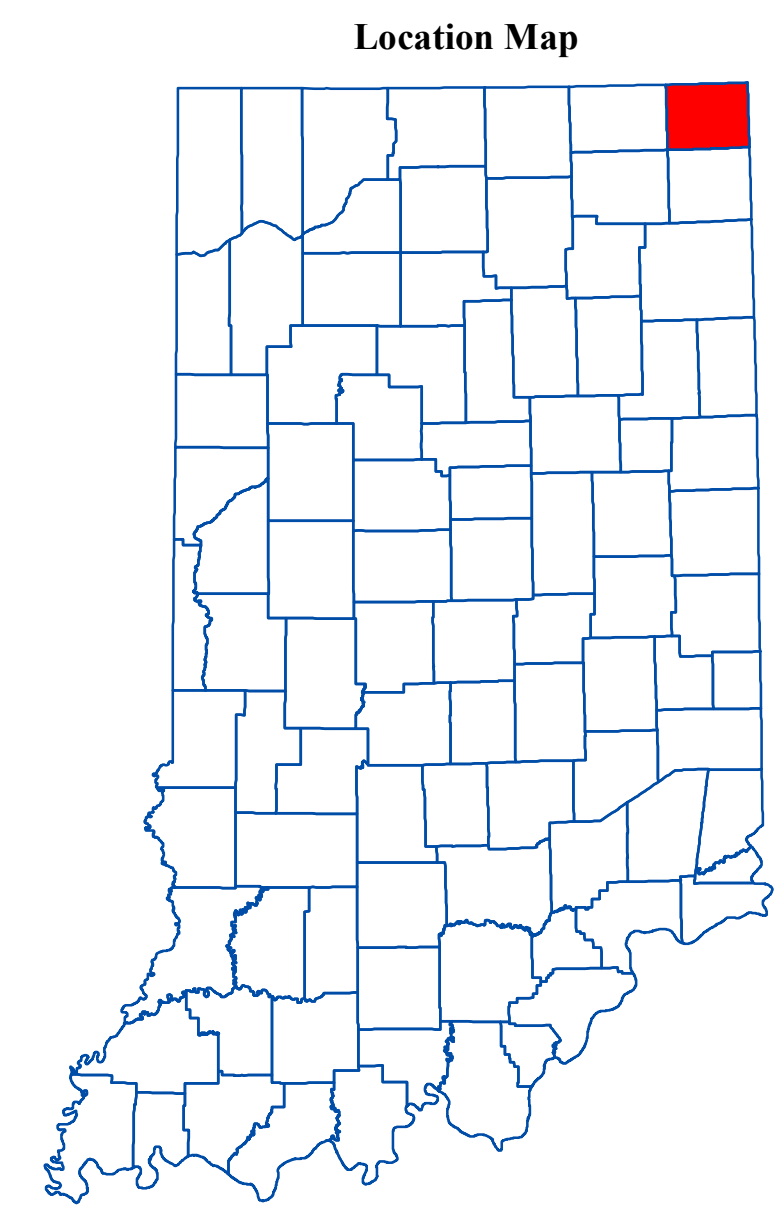
The susceptibility of bedrock aquifer systems to surface contamination is largely dependent on the type and thickness of the overlying sediments. Because the bedrock aquifer systems have complex fracturing systems, once a contaminant has been introduced into a bedrock aquifer system, it will be difficult to track and remediate.

Coldwater, Ellsworth, and Antrim Shales Aquifer System

One bedrock aquifer system is identified for Steuben County, the Devonian and Mississippian age Coldwater, Ellsworth, and Antrim Shales. The shales subcrop throughout the entire county and thicken from south to north. Oil and gas drillers' logs show that the shales attain a thickness of about 300 feet in the southern part of the county and thicken to over 700 feet in the north. These shales are commonly considered an aquitard; therefore, the system is an extremely limited ground-water resource.

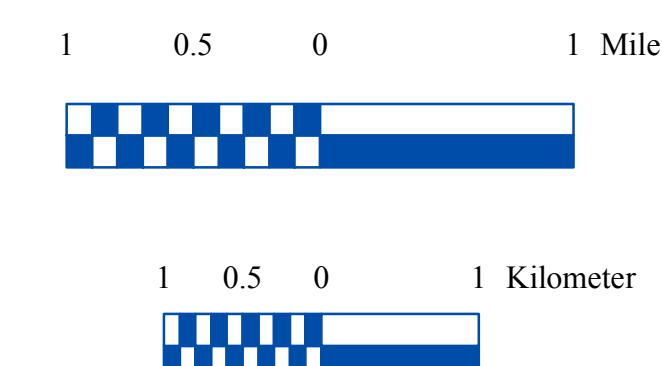
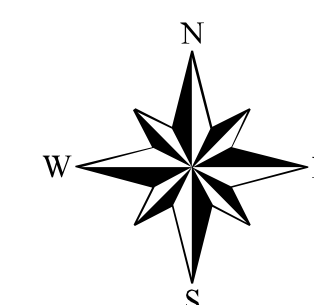
Steuben County has a complex glacial history and was subjected to multiple glacial advances from the north, northeast, and east resulting in glacial sediment deposits completely covering the county. The unconsolidated sediments range in thickness from greater than 150 feet northeast of Fremont to over 400 feet in southwestern areas of the county. Major sand and gravel aquifers occur in these unconsolidated deposits overlying the bedrock. Because of the availability of the overlying unconsolidated resources, no water wells utilize the Coldwater, Ellsworth, and Antrim Shales Aquifer System in Steuben County.

Since the permeability of shale materials is considered low and the overlying unconsolidated deposits are thick, this bedrock system is not very susceptible to contamination introduced at or near the surface.



EXPLANATION

- Stream
- County Road
- State Road & US Highway
- Interstate
- Municipal Boundary
- State Managed Property
- Lake & River



Map Use and Disclaimer Statement

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This map was created from several existing shapefiles. Township and Range Lines of Indiana (line shapefile, 20020621), Land Survey Lines of Indiana (polygon shapefile, 20020621) and County Boundaries of Indiana (polygon shapefile, 20020621), were all from the Indiana Geological Survey and based on a 1:24,000 scale, except the Bedrock Geology of Indiana (polygon shapefile, 20020318), which was at a 1:500,000 scale. Draft road shapefiles, System1 and System2 (line shapefiles, 2003), were from the Indiana Department of Transportation and based on a 1:24,000 scale. Populated Areas in Indiana 2000 (polygon shapefile, 20021000) was from the U.S. Census Bureau and based on a 1:100,000 scale. Streams27 (line shapefile, 20000420) was from the Center for Advanced Applications in GIS at Purdue University. Managed Areas 96 (polygon shapefile, various dates) was from IDNR.

Bedrock Aquifer Systems of Steuben County, Indiana

by
Division of Water

1987, 1996