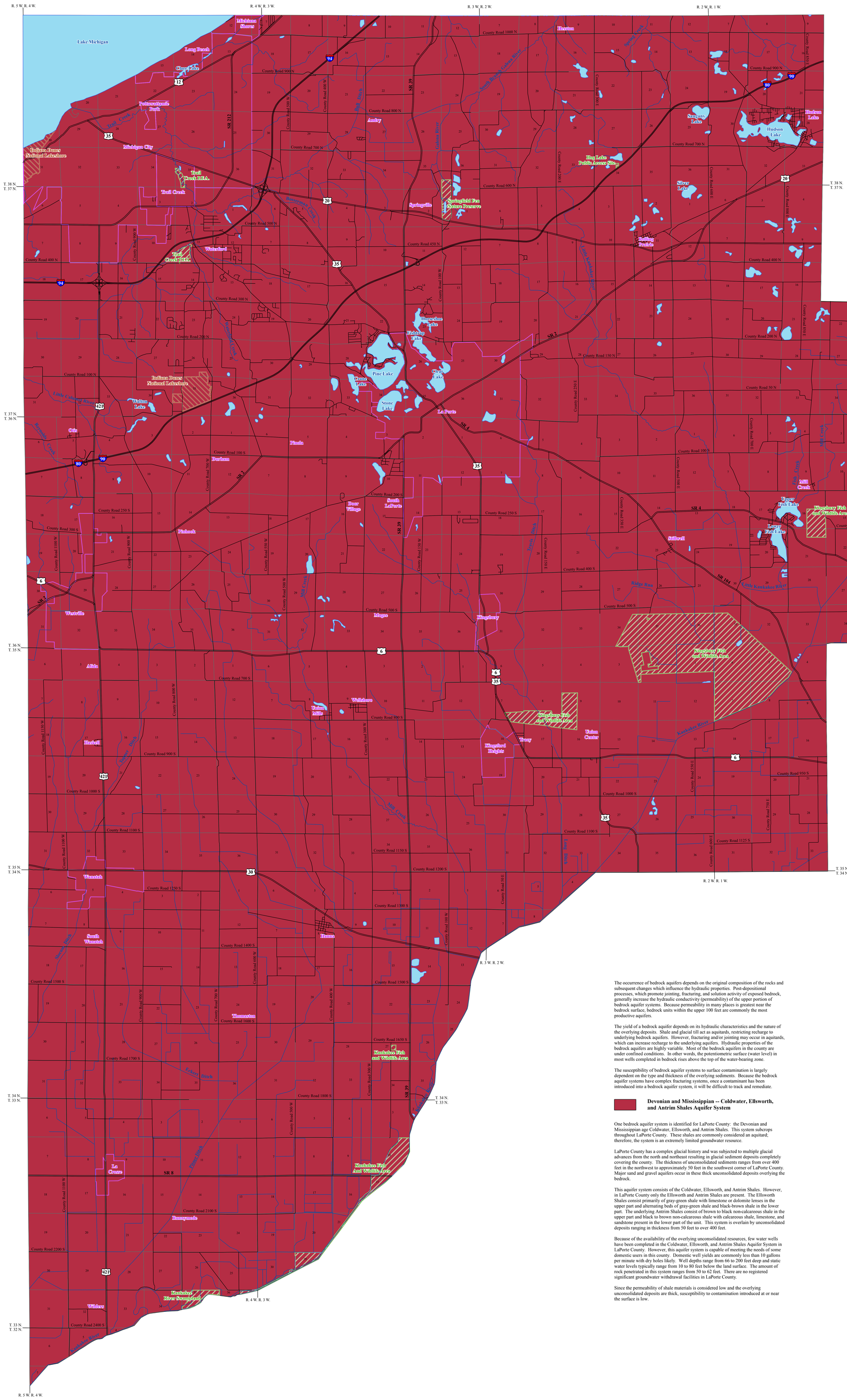
BEDROCK AQUIFER SYSTEMS OF LAPORTE COUNTY, INDIANA



The occurrence of bedrock aquifers depends on the original composition of the rocks 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. Hydraulic properties of the bedrock aquifers are highly variable. Most of the bedrock aquifers in the 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.

Devonian and Mississippian -- Coldwater, Ellsworth, and Antrim Shales Aquifer System

One bedrock aquifer system is identified for LaPorte County: the Devonian and Mississippian age Coldwater, Ellsworth, and Antrim Shales. This system subcrops throughout LaPorte County. These shales are commonly considered an aquitard; therefore, the system is an extremely limited groundwater resource.

LaPorte County has a complex glacial history and was subjected to multiple glacial advances from the north and northeast resulting in glacial sediment deposits completely covering the county. The thickness of unconsolidated sediments ranges from over 400 feet in the northwest to approximately 50 feet in the southwest corner of LaPorte County. Major sand and gravel aquifers occur in these thick unconsolidated deposits overlying the bedrock.

This aquifer system consists of the Coldwater, Ellsworth, and Antrim Shales. However, in LaPorte County only the Ellsworth and Antrim Shales are present. The Ellsworth Shales consist primarily of gray-green shale with limestone or dolomite lenses in the upper part and alternating beds of gray-green shale and black-brown shale in the lower part. The underlying Antrim Shales consist of brown to black non-calcareous shale in the upper part and black to brown non-calcareous shale with calcareous shale, limestone, and sandstone present in the lower part of the unit. This system is overlain by unconsolidated deposits ranging in thickness from 50 feet to over 400 feet.

Because of the availability of the overlying unconsolidated resources, few water wells have been completed in the Coldwater, Ellsworth, and Antrim Shales Aquifer System in LaPorte County. However, this aquifer system is capable of meeting the needs of some domestic users in this county. Domestic well yields are commonly less than 10 gallons per minute with dry holes likely. Well depths range from 66 to 200 feet deep and static water levels typically range from 10 to 80 feet below the land surface. The amount of rock penetrated in this system ranges from 50 to 62 feet. There are no registered significant groundwater withdrawal facilities in LaPorte County.

Since the permeability of shale materials is considered low and the overlying unconsolidated deposits are thick, susceptibility to contamination introduced at or near the surface is low.

EXPLANATION

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

Map generated by Scott H. Dean, January 2010
IDNR, Division of Water, Resource Assessment Section

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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.

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by

Division of Water

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