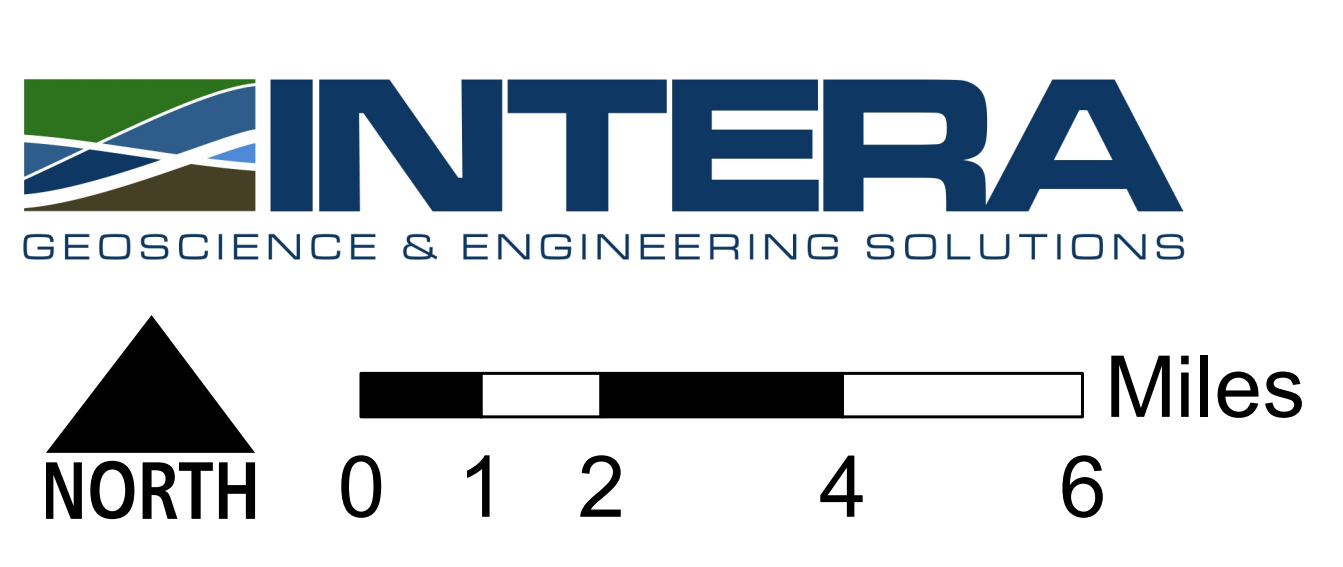
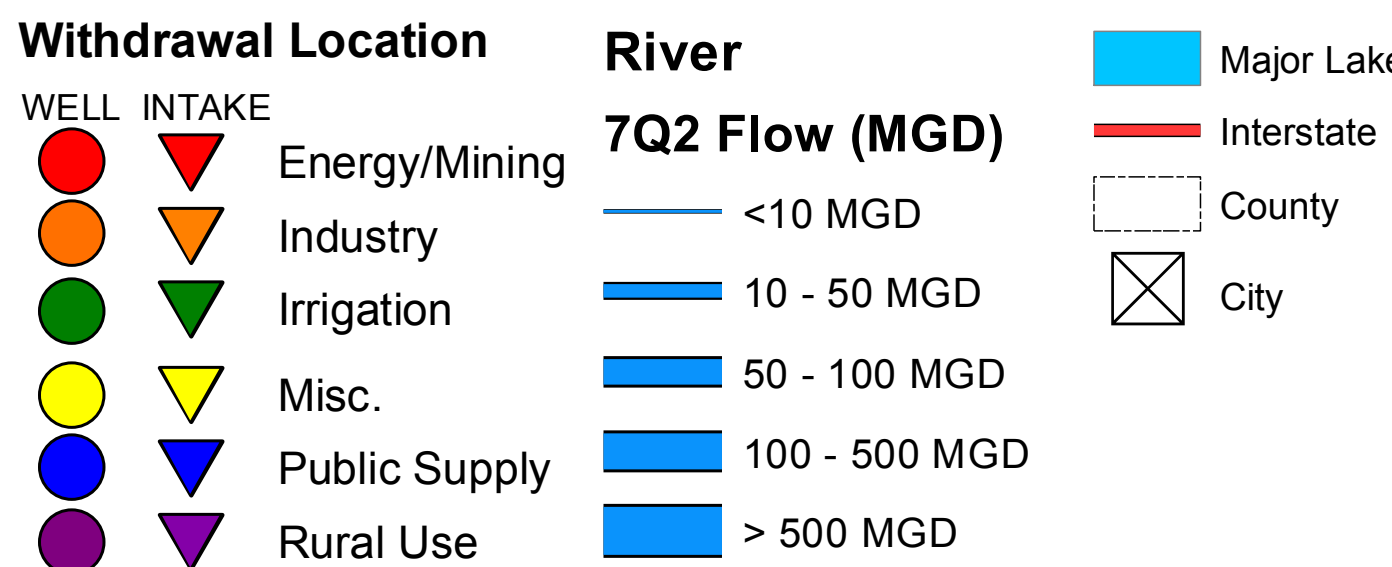


Water Resources and Use in LaPorte County

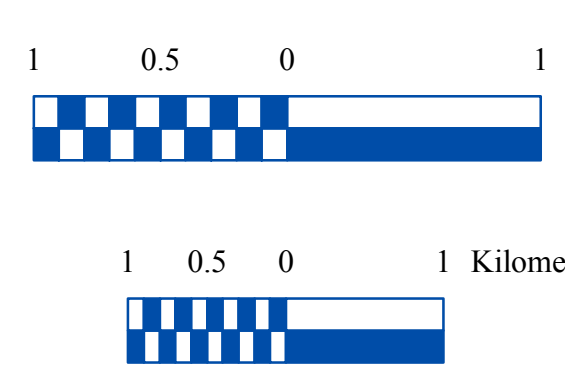
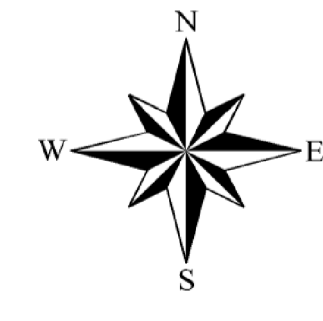
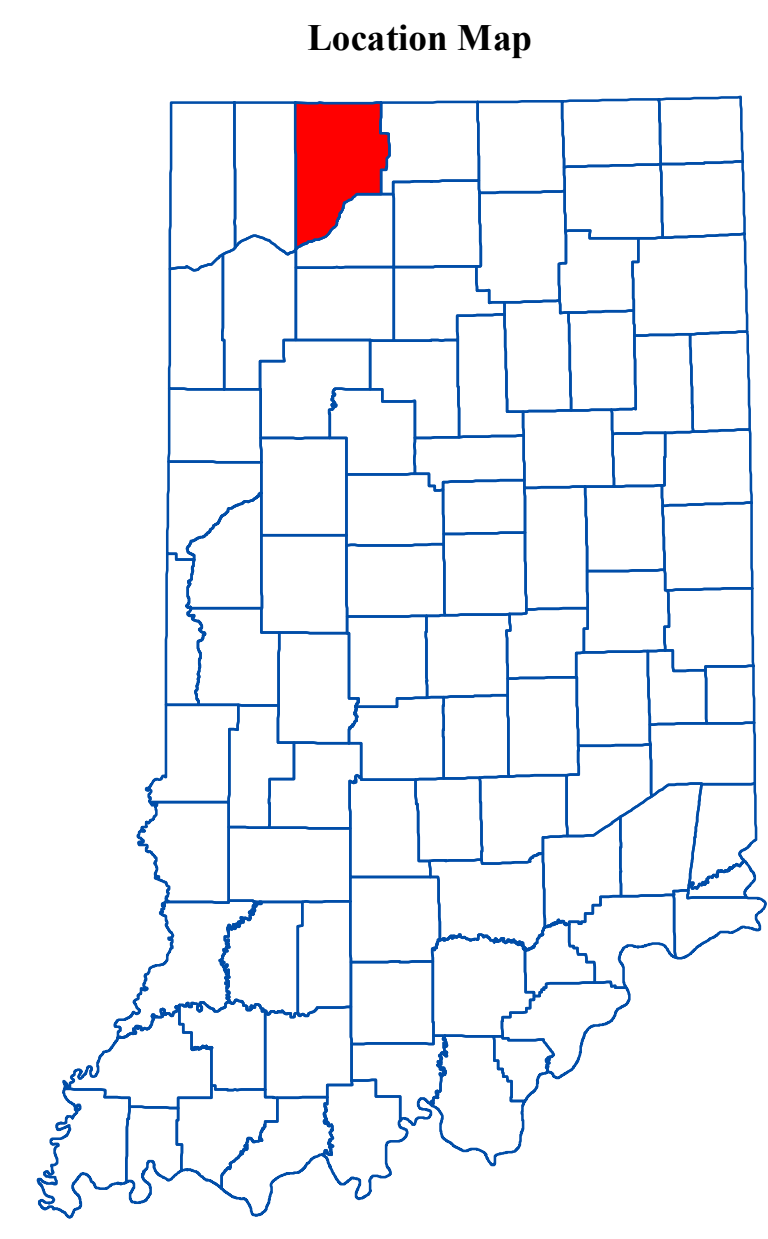
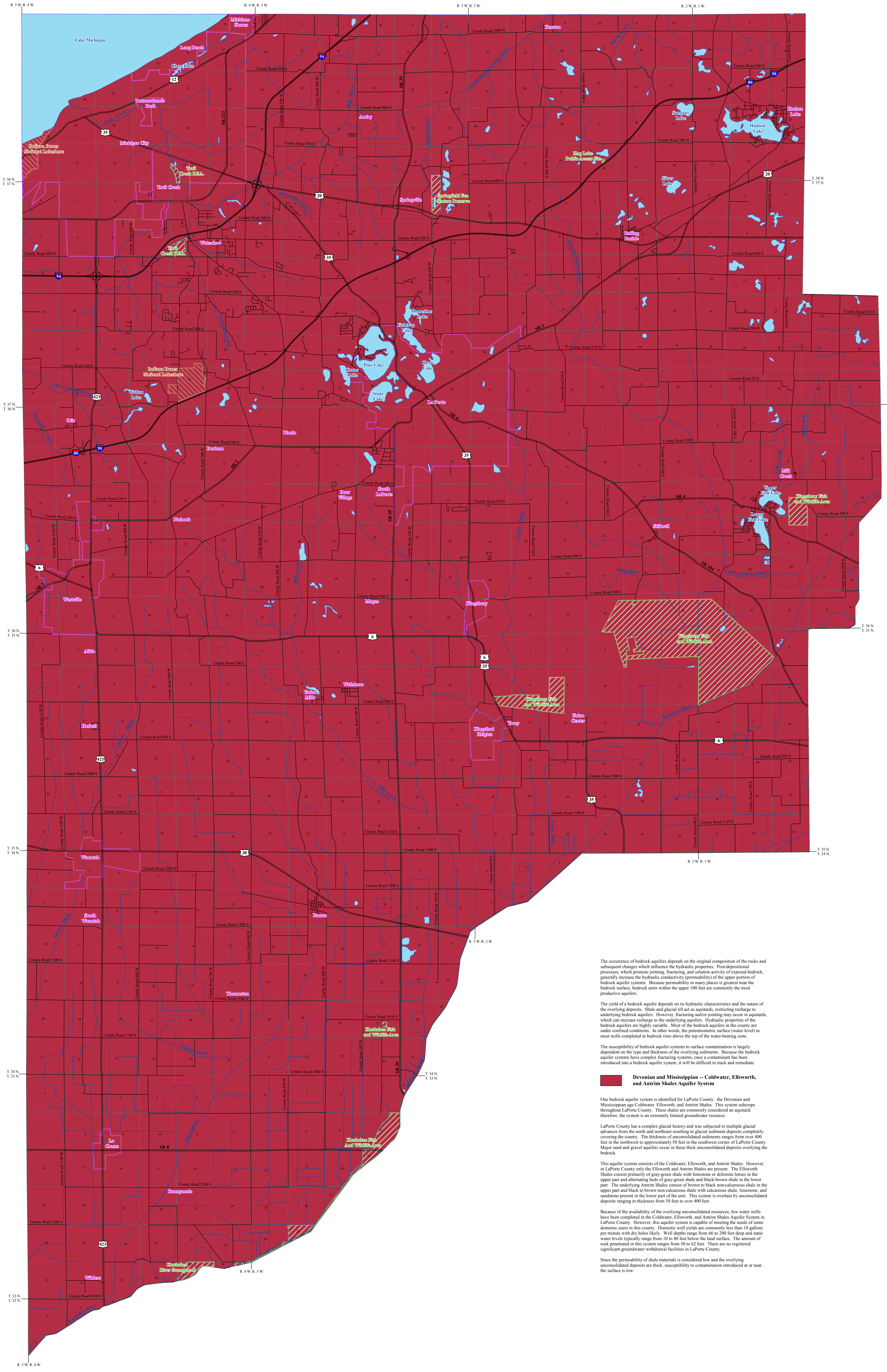
Data Sources: U.S. Geological Survey and Indiana Department of Natural Resources



BEDROCK AQUIFER SYSTEMS OF LAPORTE COUNTY, INDIANA

Michigan E. Duncik, Jr., Governor
Department of Natural Resources
Robert E. Curtis, Jr., Director

INDR DOW WRS 90-3 and 94-4



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, Elsworth, and Antrim Shales Aquifer System

One bedrock aquifer system is identified for LaPorte County - the Devonian and Mississippian age Coldwater, Elsworth, and Antrim Shales. This system underlies 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, Elsworth, and Antrim Shales. However, in LaPorte County only the Elsworth and Antrim Shales are present. The Elsworth 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, Elsworth, 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 protected 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

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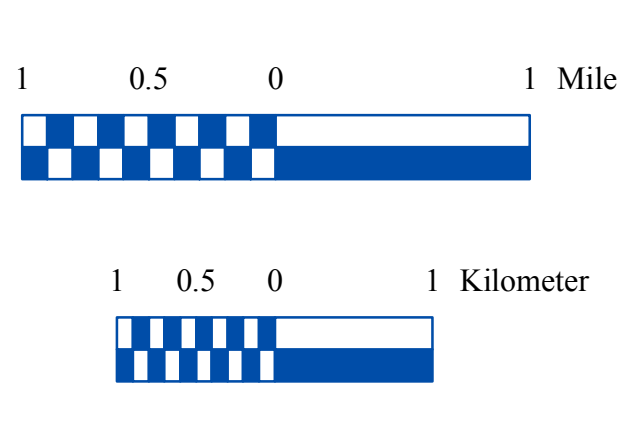
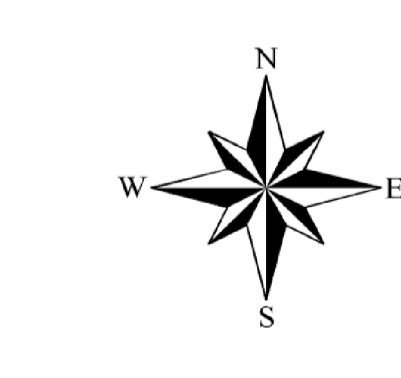
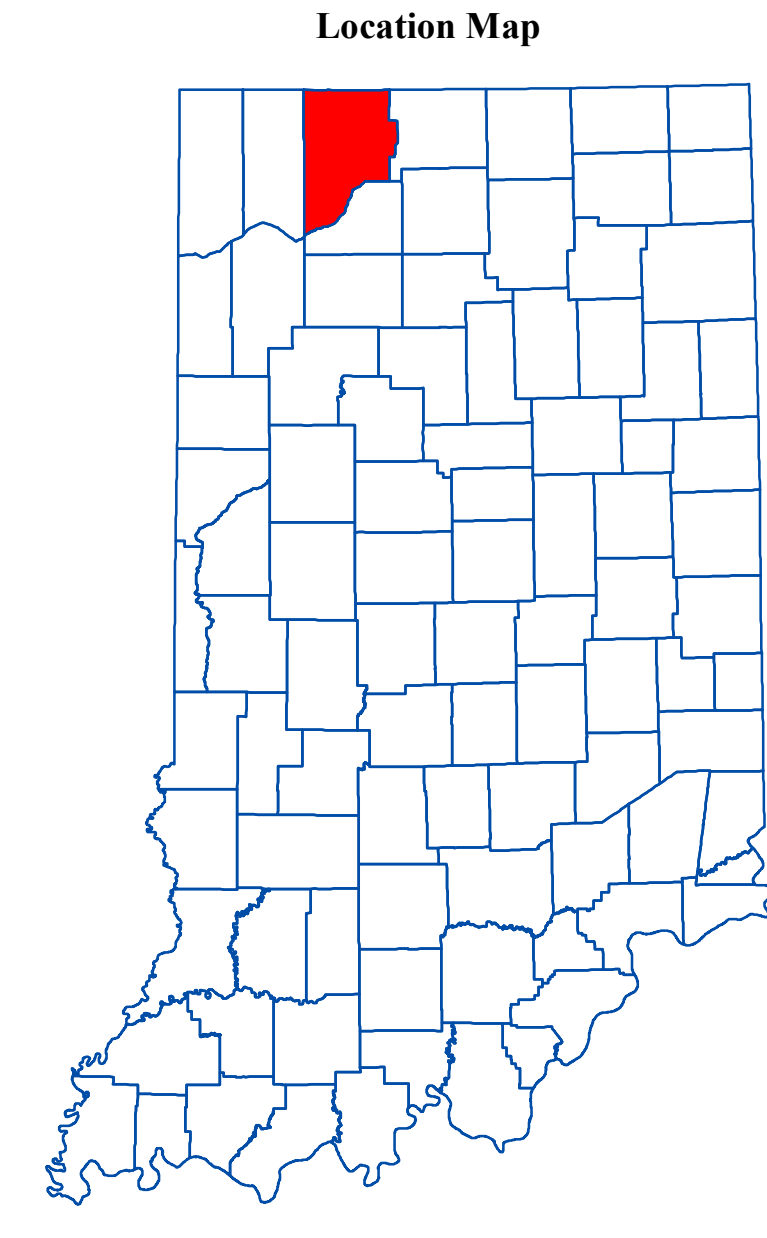
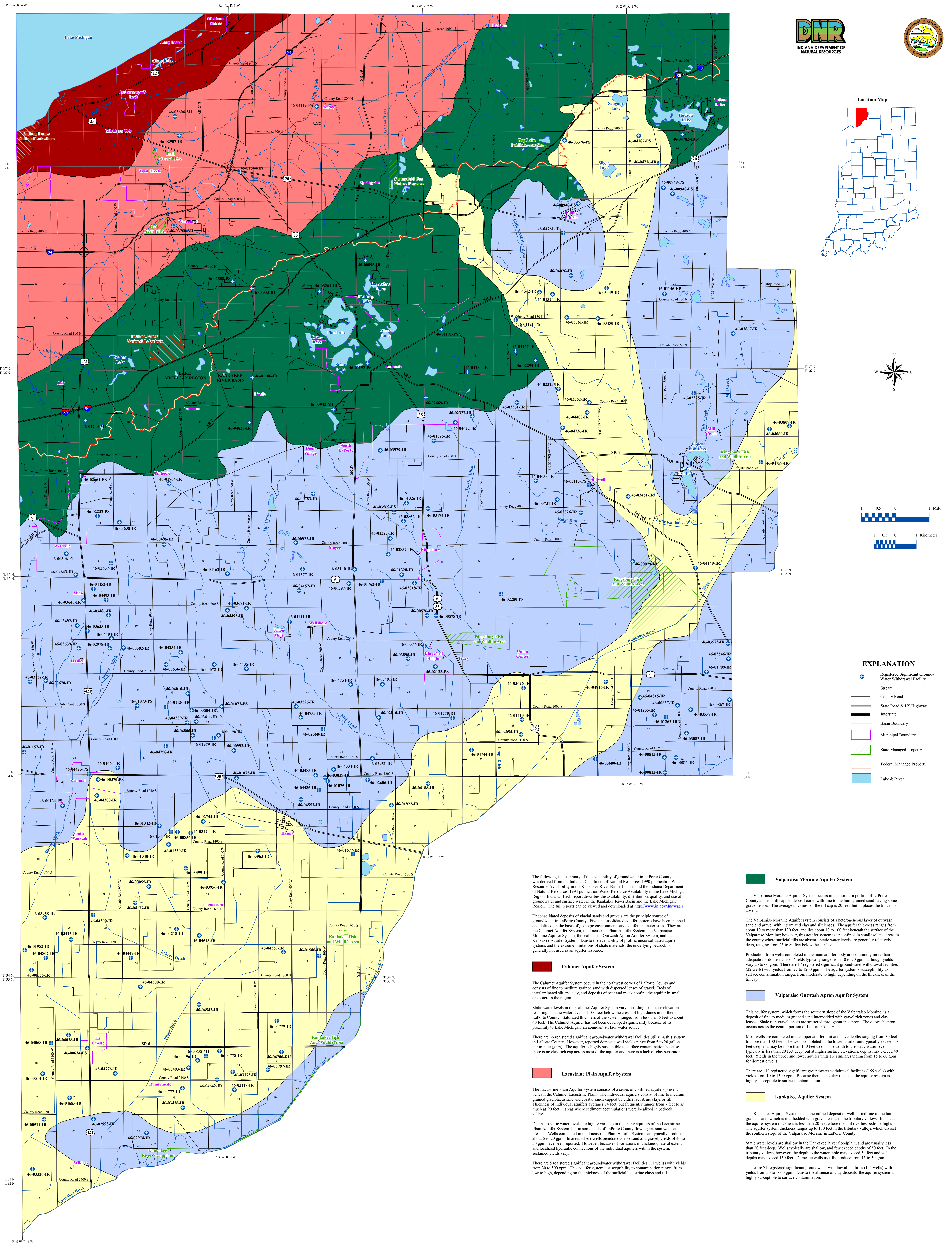
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Bedrock Aquifer Systems of LaPorte County, Indiana

by
Division of Water
1990, 1994

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

UNCONSOLIDATED AQUIFER SYSTEMS OF LAPORTE COUNTY, INDIANA



EXPLANATION

- Registered Significant Groundwater Withdrawal Facility
- Stream
- County Road
- State Road & US Highway
- Interstate
- Basin Boundary
- Municipal Boundary
- State Managed Property
- Federal Managed Property
- Lake & River

Valparaiso Moraine Aquifer System

The Valparaiso Moraine Aquifer System occurs in the northern portion of LaPorte County and is a till capped deposit cored with fine to medium grained sand having some gravel lenses. The average thickness of the till cap is 20 feet, but in places the till cap is absent.

The Valparaiso Moraine Aquifer system consists of a heterogeneous layer of outwash sand and gravel with interbedded clay and silt lenses. The aquifer thickness ranges from about 10 to more than 130 feet, and lies about 10 to 100 feet beneath the surface of the Valparaiso Moraine. However, this aquifer system is unconfined in small isolated areas in the county where surficial tills are absent. Static water levels are generally relatively deep, ranging from 25 to 80 feet below the surface.

Production from wells completed in the main aquifer body are commonly more than adequate for domestic use. Yields typically range from 10 to 20 gpm, although yields vary up to 60 gpm. There are 17 registered significant groundwater withdrawal facilities (32 wells) with yields from 27 to 1200 gpm. The aquifer system's susceptibility to surface contamination ranges from moderate to high, depending on the thickness of the till cap.

Calumet Aquifer System

The Calumet Aquifer System occurs in the northwest corner of LaPorte County and consists of fine to medium grained sand with dispersed lenses of gravel. Beds of interbedded silt and clay, and deposits of peat and muck confine the aquifer in small areas across the region.

Static water levels in the Calumet Aquifer System vary according to surface elevation resulting in static water levels of 100 feet below the crests of high dunes in northern LaPorte County. Saturated thickness of the system ranged from less than 5 feet to about 40 feet. The Calumet Aquifer has not been developed significantly because of its proximity to Lake Michigan, an abundant surface water source.

There are no registered significant groundwater withdrawal facilities utilizing this system in LaPorte County. However, reported domestic well yields range from 5 to 20 gallons per minute (gpm). The aquifer is highly susceptible to surface contamination because there is no clay rich cap across most of the aquifer and there is a lack of clay separator beds.

Valparaiso Outwash Apron Aquifer System

This aquifer system, which forms the southern slope of the Valparaiso Moraine, is a deposit of fine to medium grained sand interbedded with gravel rich zones and clay lenses. Shale rich gravel lenses are scattered throughout the apron. The outwash apron occurs across the central portion of LaPorte County.

Most wells are completed in the upper aquifer unit and have depths ranging from 30 feet to more than 100 feet. The wells completed in the lower aquifer unit typically exceed 50 feet deep and may be more than 150 feet deep. The depth to the static water level typically is less than 20 feet deep, but at higher surface elevations, depths may exceed 40 feet. Yields in the upper and lower aquifer units are similar, ranging from 15 to 60 gpm for domestic wells.

There are 118 registered significant groundwater withdrawal facilities (150 wells) with yields from 10 to 1500 gpm. Because there is no clay rich cap, the aquifer system is highly susceptible to surface contamination.

Lacustrine Plain Aquifer System

The Lacustrine Plain Aquifer System consists of a series of confined aquifers present beneath the Calumet Lacustrine Plain. The individual aquifers consist of fine to medium grained glauconitic and coastal sands capped by either lacustrine clays or till. Thickness of individual aquifers averages 24 feet, but frequently ranges from 7 feet to as much as 90 feet in areas where sediment accumulations were localized in bedrock valleys.

Depths to static water levels are highly variable in the many aquifers of the Lacustrine Plain Aquifer System, but in some parts of LaPorte County flowing artesian wells are present. Wells completed in the Lacustrine Plain Aquifer System can typically produce about 5 to 20 gpm. In areas where wells penetrate coarse sand and gravel, yields of 40 to 50 gpm have been reported. However, because of variations in thickness, lateral extent, and localized hydraulic connections of the individual aquifers within the system, sustained yields vary.

There are 5 registered significant groundwater withdrawal facilities (11 wells) with yields from 30 to 500 gpm. This aquifer system's susceptibility to surface contamination ranges from low to high, depending on the thickness of the surficial lacustrine clays and till.

Kankakee Aquifer System

The Kankakee Aquifer System is an unconfined deposit of well-sorted fine to medium grained sand, which is interbedded with gravel lenses in the tributary valleys. In places the aquifer system thickness is less than 20 feet where the unit overlies bedrock highs. The aquifer system thickness ranges up to 100 feet in the tributary valleys which dissect the southern slope of the Valparaiso Moraine in LaPorte County.

Static water levels are shallow in the Kankakee River floodplain, and are usually less than 20 feet deep. Wells typically are shallow, and few exceed depths of 50 feet. In the tributary valleys, however, the depth to the water table may exceed 50 feet and well depths may exceed 150 feet. Domestic wells usually produce from 15 to 50 gpm.

There are 71 registered significant groundwater withdrawal facilities (141 wells) with yields from 50 to 1600 gpm. Due to the absence of clay deposits, the aquifer system is highly susceptible to surface contamination.

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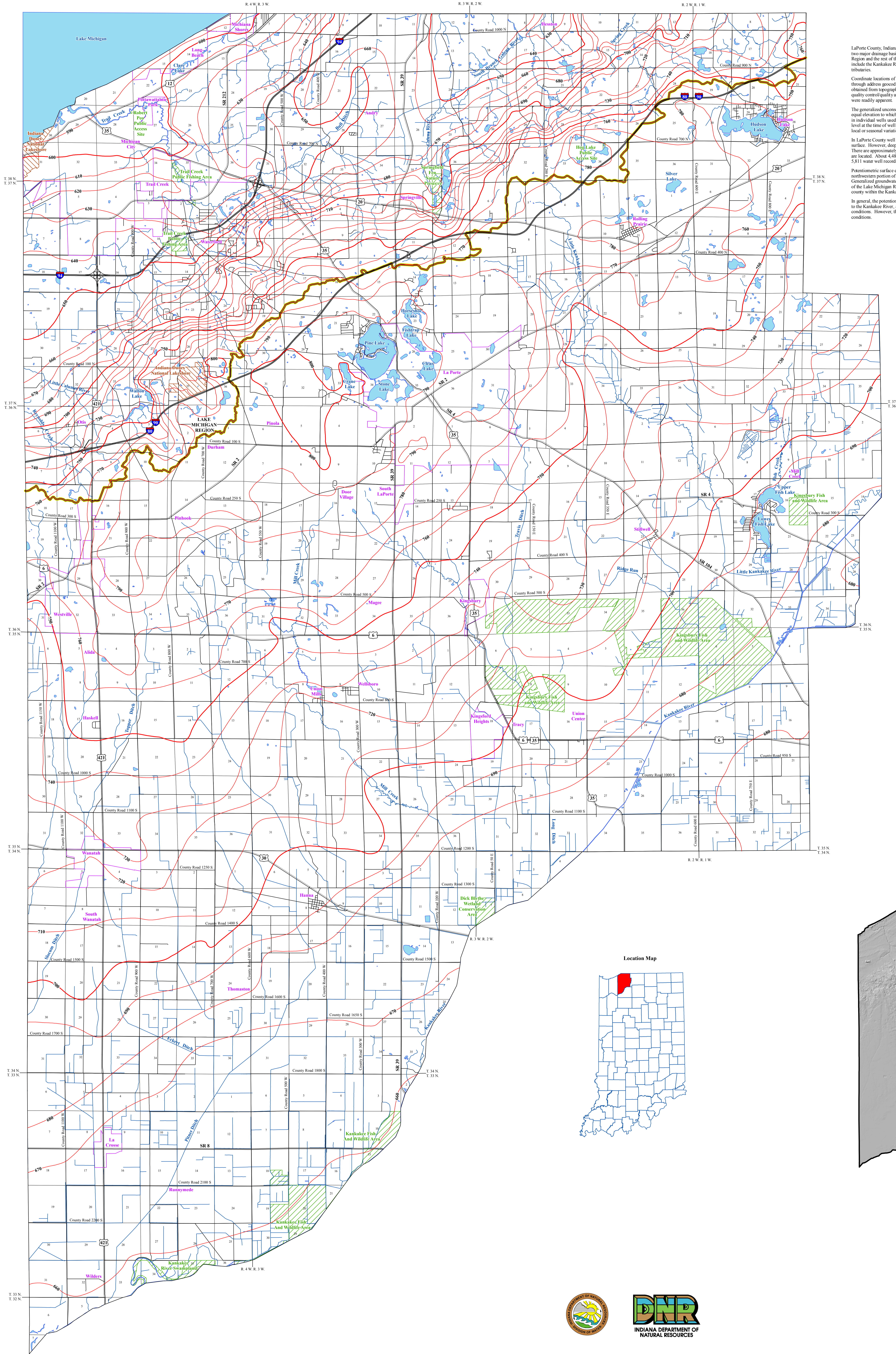
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Unconsolidated Aquifer Systems of LaPorte County, Indiana

by
 Division of Water
 1990, 1994

POTENTIOMETRIC SURFACE MAP OF THE UNCONSOLIDATED AQUIFERS OF LAPORTE COUNTY, INDIANA



LaPorte County, Indiana is located in the northwest portion of the state and is situated within two major drainage basins. The northern portion of the county is within the Lake Michigan Region and the rest of the county is within the Kankakee River Basin. Major drainage systems include the Kankakee River, the Little Kankakee River, and Trail Creek along with several tributaries.

Coordinates locations of water well records were physically obtained in the field, determined through address geocoding or reported on water well records. Elevation data were either obtained from topographic maps or a digital elevation model (DEM). Elevation and location quality control quality assurance procedures were utilized to refine or remove data where errors were readily apparent.

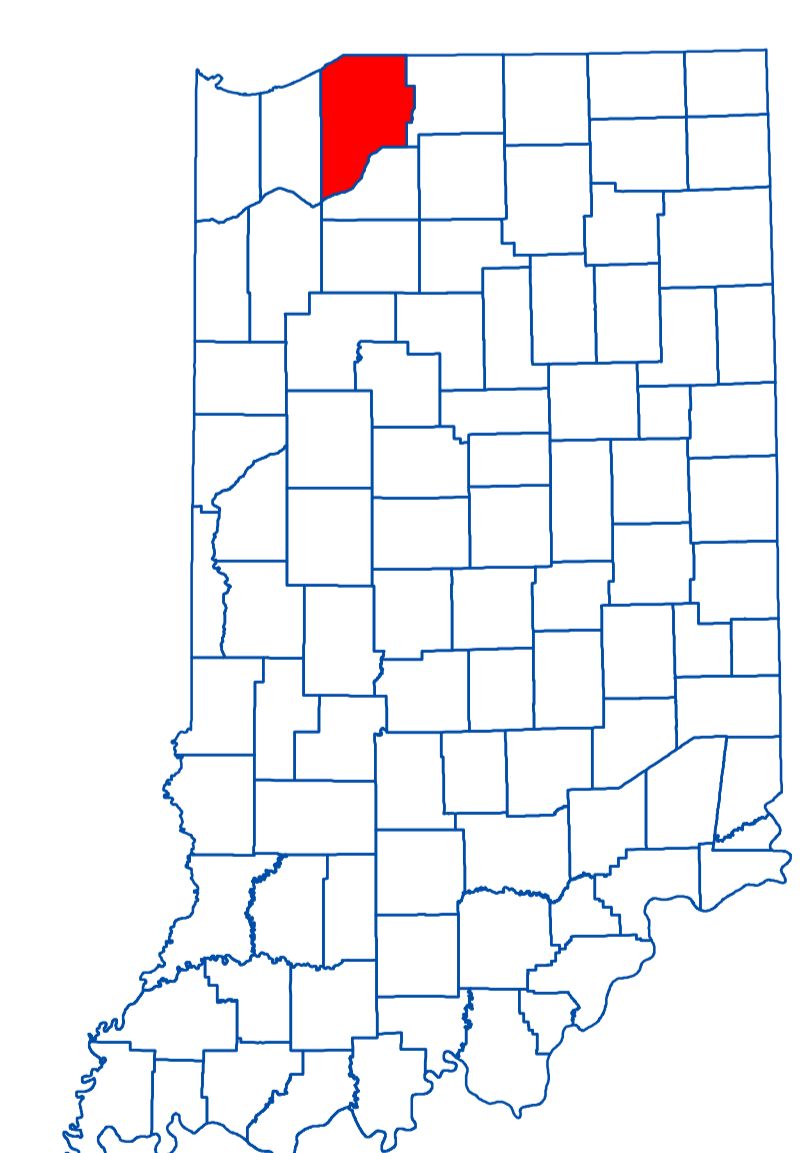
The generalized unconsolidated potentiometric surface map contour elevations represent lines of equal elevation to which groundwater levels will rise in wells. Static water level measurements in individual wells used to construct the potentiometric surface map are indicative of the water level at the time of well completion. Therefore, current site specific conditions may differ due to local or seasonal variations in measured static water levels.

In LaPorte County well depths 100 feet or less were a priority in mapping the potentiometric surface. However, deeper wells were often completed and used in areas where data was sparse. There are approximately 12,100 water well records in the county of which, about 5,800 (47%) are located. About 4,480 (77%) of the located wells are less than 100 feet in depth. A total of 5,811 water well records were used to construct the groundwater potential lines.

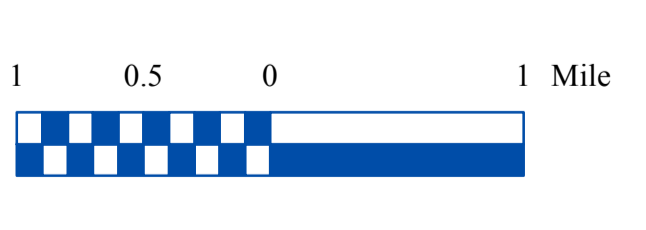
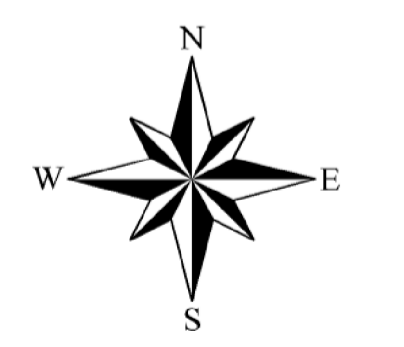
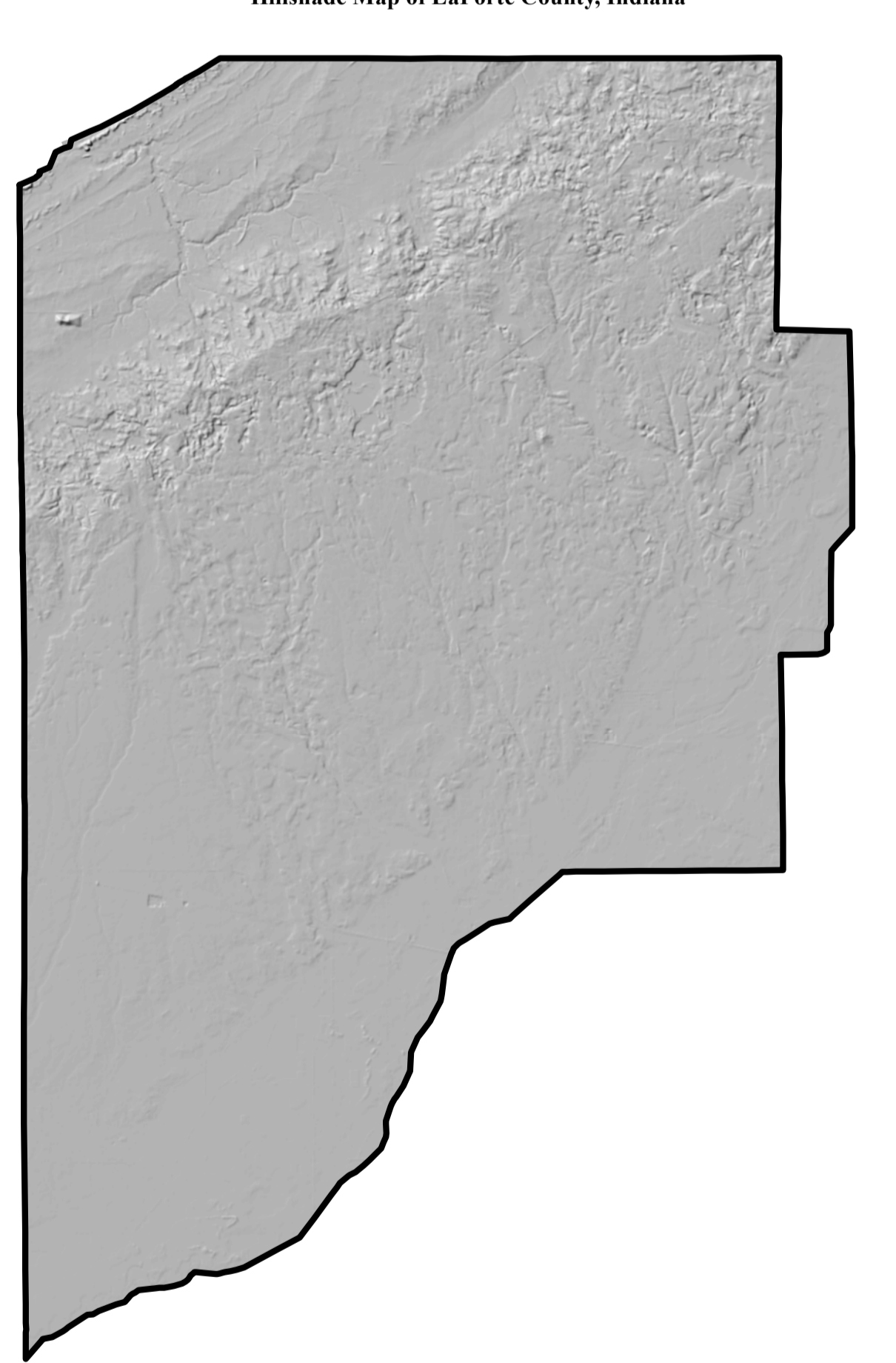
Potentiometric surface elevations range from a high of 880 feet mean sea level (msl) in the northwest portion of central LaPorte County, to a low of 590 feet msl in the southwest corner of the Lake Michigan Region. Groundwater flow for the central and southern portions of the county within the Kankakee River Basin appears to be to the southeast.

In general, the potentiometric surface in the lower two-thirds of LaPorte County, portions close to the Kankakee River and areas near Lake Michigan are under semi-confined or unconfined conditions. However, the remaining portions of LaPorte County may be under confined conditions.

Location Map



Hillshade Map of LaPorte County, Indiana



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Potentiometric Surface Map of the Unconsolidated Aquifers of LaPorte County, Indiana

by
Robert A. Scott
Division of Water, Resource Assessment Section
March, 2012

LaPorte County

