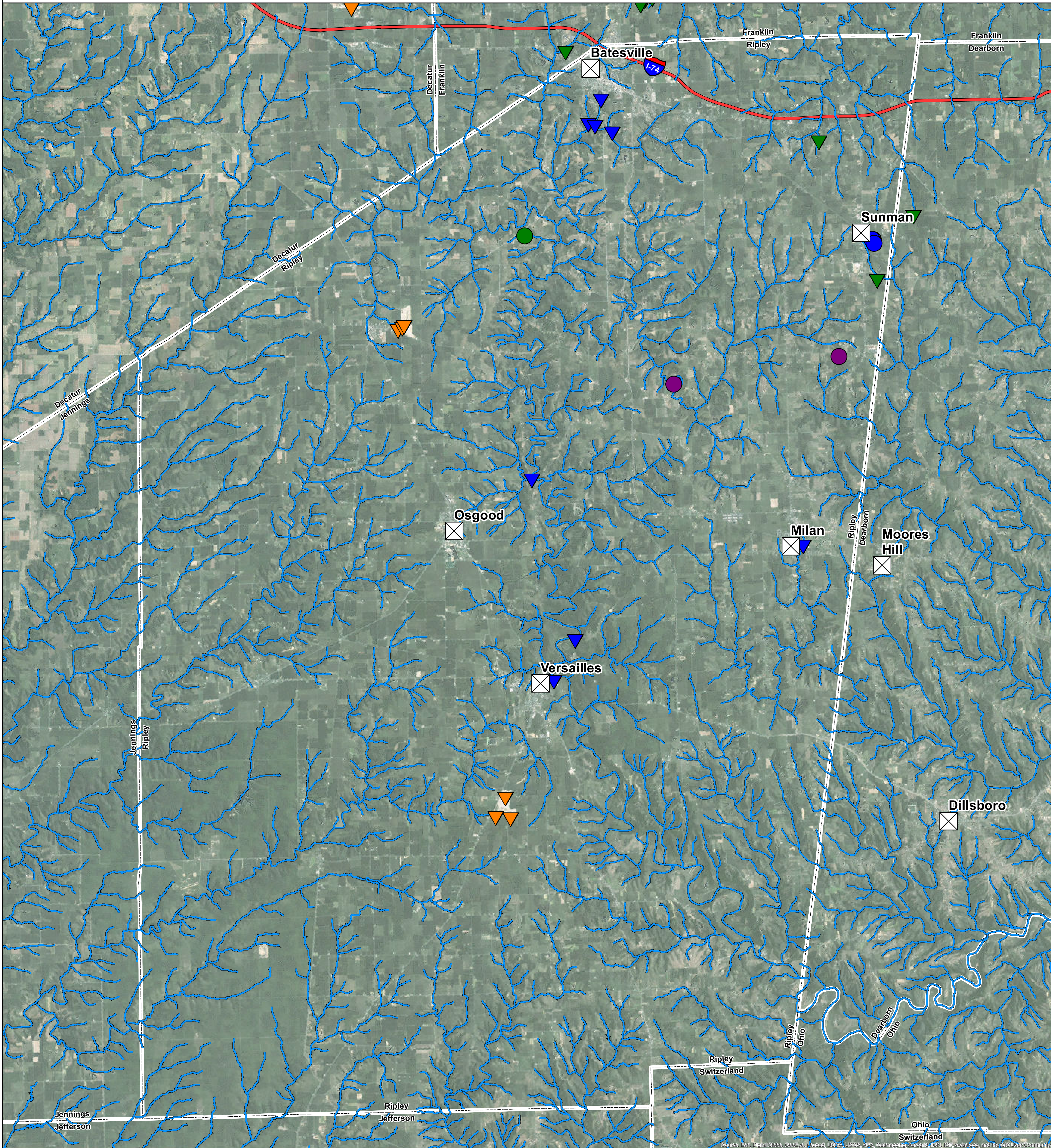
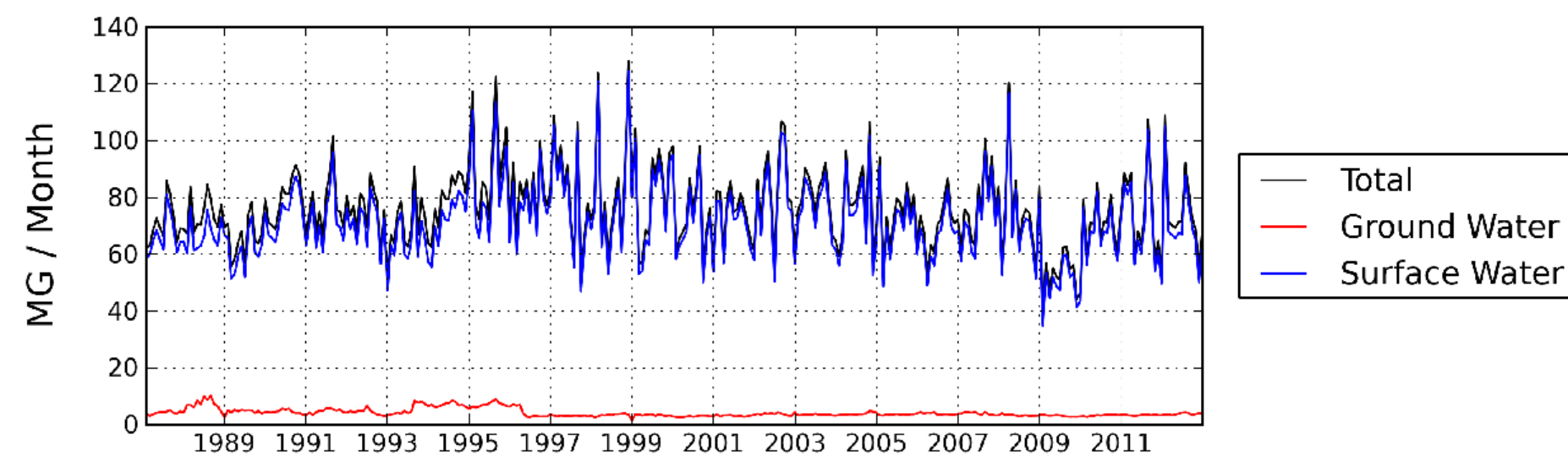
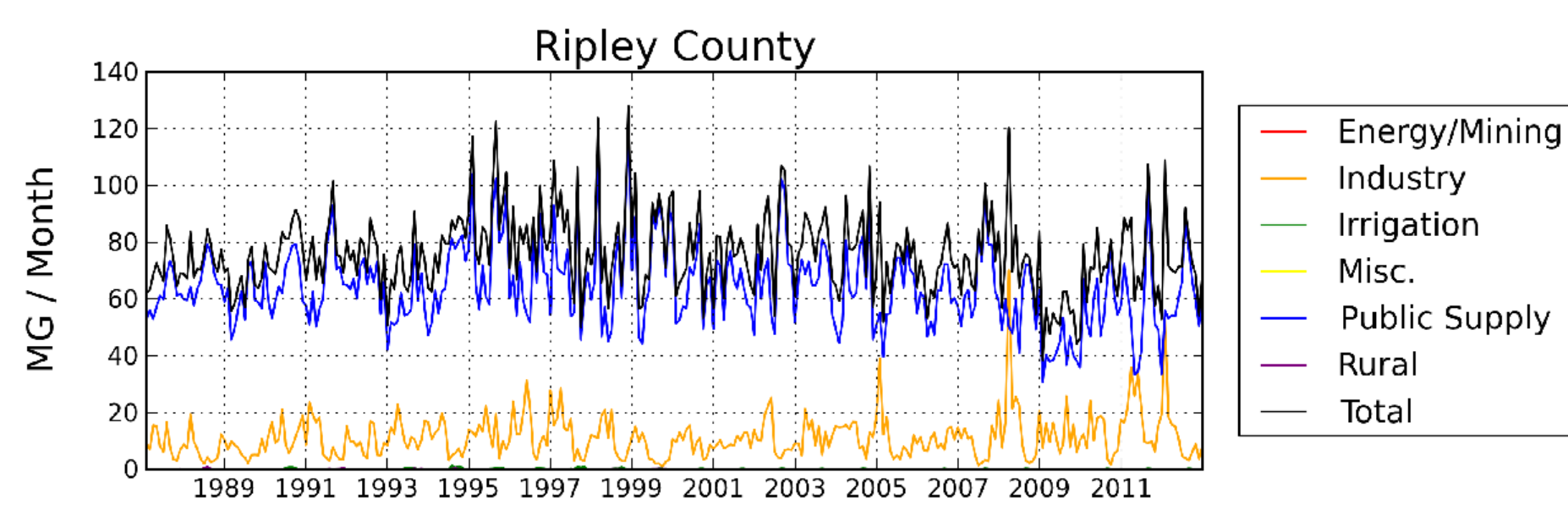


Average Daily Use: 2.5 MGD



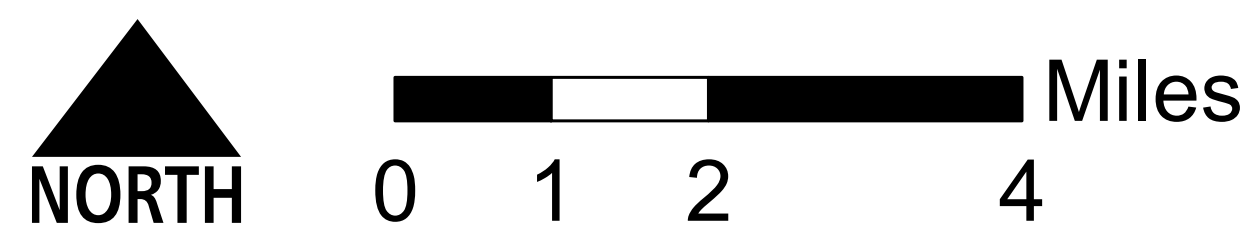
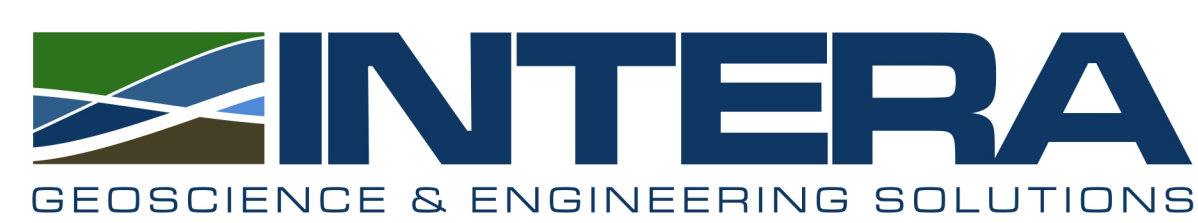
# Water Resources and Use in Ripley County

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

- Withdrawal Location**
- WELL INTAKE
- Energy/Mining
  - ▲ Industry
  - ▼ Irrigation
  - ▲ Misc.
  - Public Supply
  - ▼ Rural Use

- River**
- 7Q2 Flow (MGD)
- <10 MGD
  - 10 - 50 MGD
  - 50 - 100 MGD
  - 100 - 500 MGD
  - > 500 MGD

- Major Lakes
- Interstate
- County
- City



# BEDROCK AQUIFER SYSTEMS OF RIPLEY COUNTY, INDIANA

In Ripley County, rock types exposed at the bedrock surface are relatively poorly productive limestones and dolomites with varying amounts of interbedded shales to poorly productive shales with limestone interbeds.

Bedrock aquifers are only minor sources of ground water in this county. Bedrock wells are more common in the southern part of the county (south of Versailles) where unconsolidated materials are thin. However, over 30 percent of bedrock wells in this area have extremely poor yields (dry holes or pumped dry when originally tested). Low-production large diameter wells using the unconsolidated materials above the shallow bedrock are also common in this area.

The susceptibility of bedrock aquifer systems to surface contamination is largely dependent on the type and thickness of the overlying sediments. Just as recharge for bedrock aquifers cannot exceed that of overlying unconsolidated deposits, susceptibility to surface contamination will not exceed that of overlying deposits. However, 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.

## Silurian and Devonian Carbonates Aquifer System

This bedrock aquifer system includes primarily Silurian and early Devonian age carbonates in the outcrop/subcrop area in Ripley County. This aquifer system also includes the overlying middle Devonian age Muscatuck Group, where it is present in an extremely small area (about 1 square mile) in the southwestern part of the county. Because units of the Silurian and Devonian system are composed of similar carbonate rock types, and cannot easily be distinguished on the basis of water well records, they are considered as a single water-bearing system. It is composed mostly of limestone and dolomite with some interbedded shale units. The outcrop/subcrop area of the Silurian and Devonian carbonates covers roughly the western half of the county, but these rocks are absent where larger streams have cut down to expose the underlying Maquoketa Group. In this county the thickness of the Silurian and Devonian Carbonates Aquifer System is less than 100 feet.

The depth to the bedrock surface in the Silurian and Devonian Carbonates is generally less than 50 feet. Very few wells are completed in the Silurian and Devonian Carbonates Aquifer System in this county. Although some produce over 5 gallons per minute (gpm), most of these wells are reported to be dry or pumped dry. Most bedrock wells within the outcrop/subcrop area extend into the deeper carbonates of the underlying Maquoketa Group, because the Silurian and Devonian Carbonates Aquifer System lacks sufficient thickness to allow reliable well production for most domestic needs.

This aquifer system is generally not very susceptible to contamination from the land surface, except where karst development is significant or where overlying clay-rich till and residuum is thin or absent.

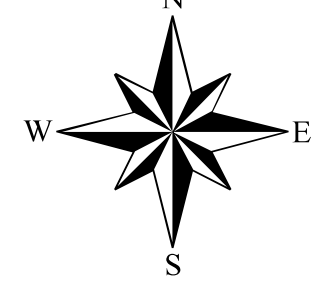
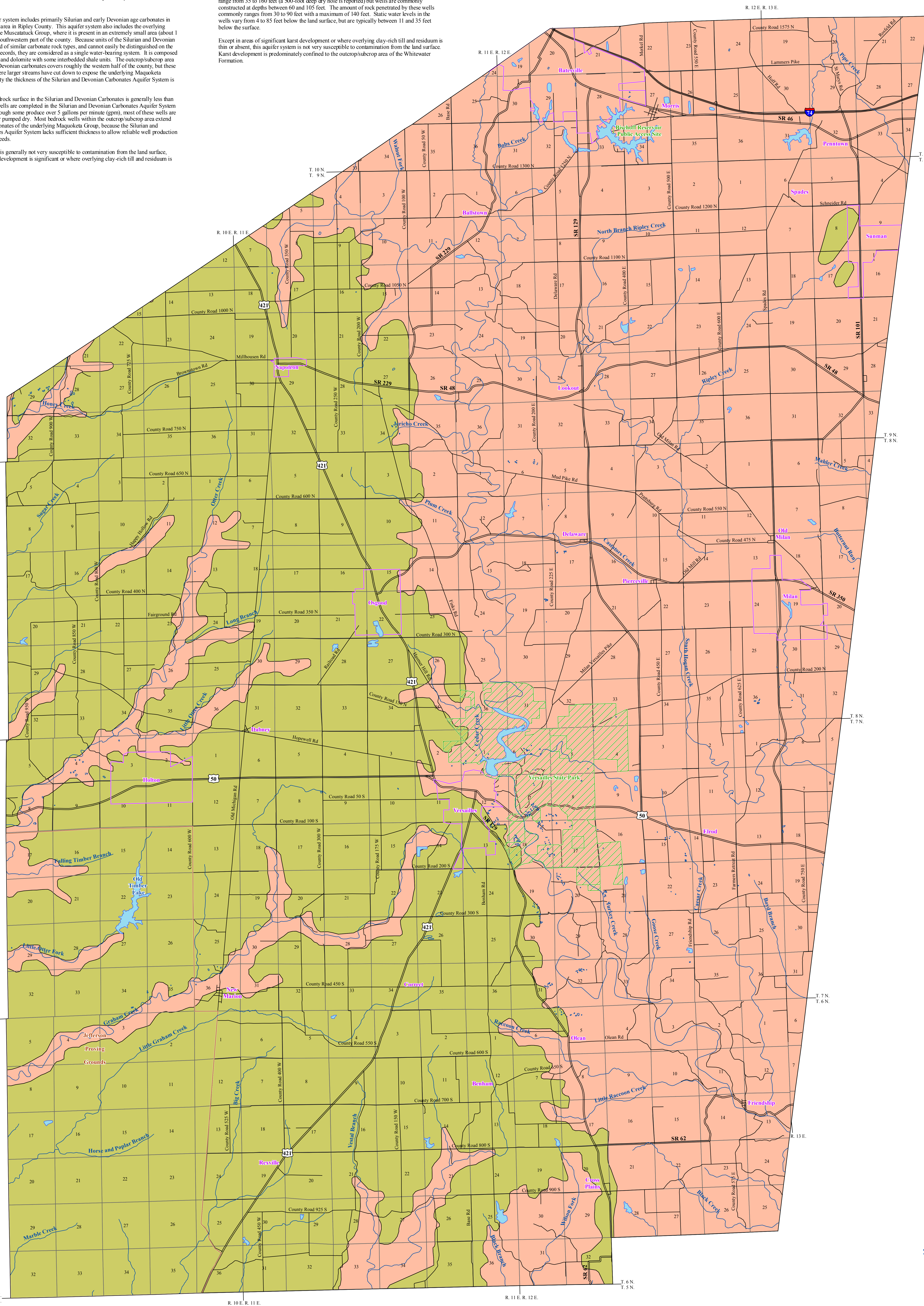
## Ordovician-Maquoketa Group Aquifer System

The outcrop/subcrop of the Maquoketa Group in Ripley County covers much of the eastern half of the county and many bedrock valleys in the western part of the county. The Maquoketa Group consists in ascending order of the Kops, Dillsboro, and Whitewater Formations. It unconformably overlies the Trenton Limestone and Lexington Limestone in the northwestern and southeastern parts of the county, respectively. Between these areas, in a band trending southwest to northeast, the Maquoketa Group directly overlies the Black River Group due to the absence of the Trenton and Lexington Limestones. The Maquoketa Group consists mostly of shales with interbedded limestone units. Although this system is approximately 800 to 900 feet thick in the county, few wells have used more than the top 100 feet for water production.

The Maquoketa Group is considered a minor ground-water source in the county. Most wells for homes, irrigation, and stock produce between 1 and 5 gpm. Localized yields may exceed 20 gpm; however, (pumped) dry holes are quite common.

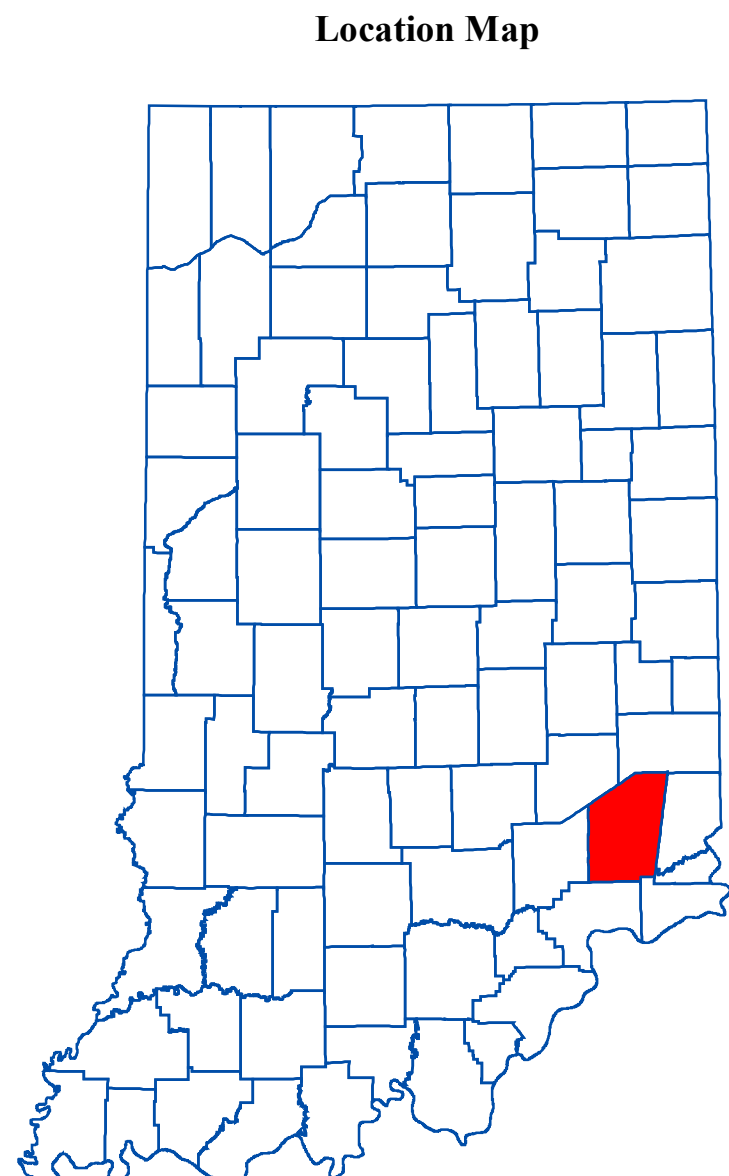
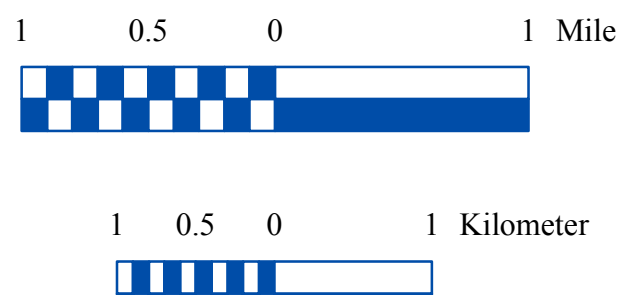
The depth to the bedrock surface is typically 10 to 45 feet. Well depths in the Maquoketa Group range from 35 to 160 feet (a 500-foot deep dry hole is reported) but wells are commonly constructed at depths between 60 and 105 feet. The amount of rock penetrated by these wells commonly ranges from 30 to 60 feet with a maximum of 140 feet. Static water levels in the wells vary from 4 to 85 feet below the land surface, but are typically between 11 and 35 feet below the surface.

Except in areas of significant karst development or where overlying clay-rich till and residuum is thin or absent, this aquifer system is not very susceptible to contamination from the land surface. Karst development is predominantly confined to the outcrop/subcrop area of the Whitewater Formation.



**EXPLANATION**

- Stream
- County Road
- State Road & US Highway
- Interstate
- Municipal Boundary
- USGS Closed Contours (Mostly Karst Depressions)
- Jefferson Proving Ground
- State Managed Property
- Lake & River



### Map Use and Disclaimer Statement

We request that the following agency be acknowledged in products derived from this map: Indiana Department of Natural Resources, Division of Water. This map was compiled by staff of the Indiana Department of Natural Resources, Division of Water using data believed to be reasonably accurate. However, a degree of error is inherent in all maps. This product is distributed "as is" without warranties of any kind, either expressed or implied. This map is intended for use only at the published scale.

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, 20050621) were all from the Indiana Geological Survey and based on a 1:24,000 scale, except the Bedrock Geology of Southwestern Indiana (polygon shapefile, 20001124), which was at a 1:50,000 scale. System1 and System2 were from the Indiana Department of Transportation (line shapefile, 2003) and based on a 1:24,000 scale. Managed Areas66 (polygon shapefile, various dates) was from DNR. City Areas in Southwestern Indiana (polygon shapefile, 1999) was from ESRI and based on a 1:100,000 scale. Streams27 (line shapefile, 20000420) was from the Center for Advanced Applications in GIS at Purdue University.

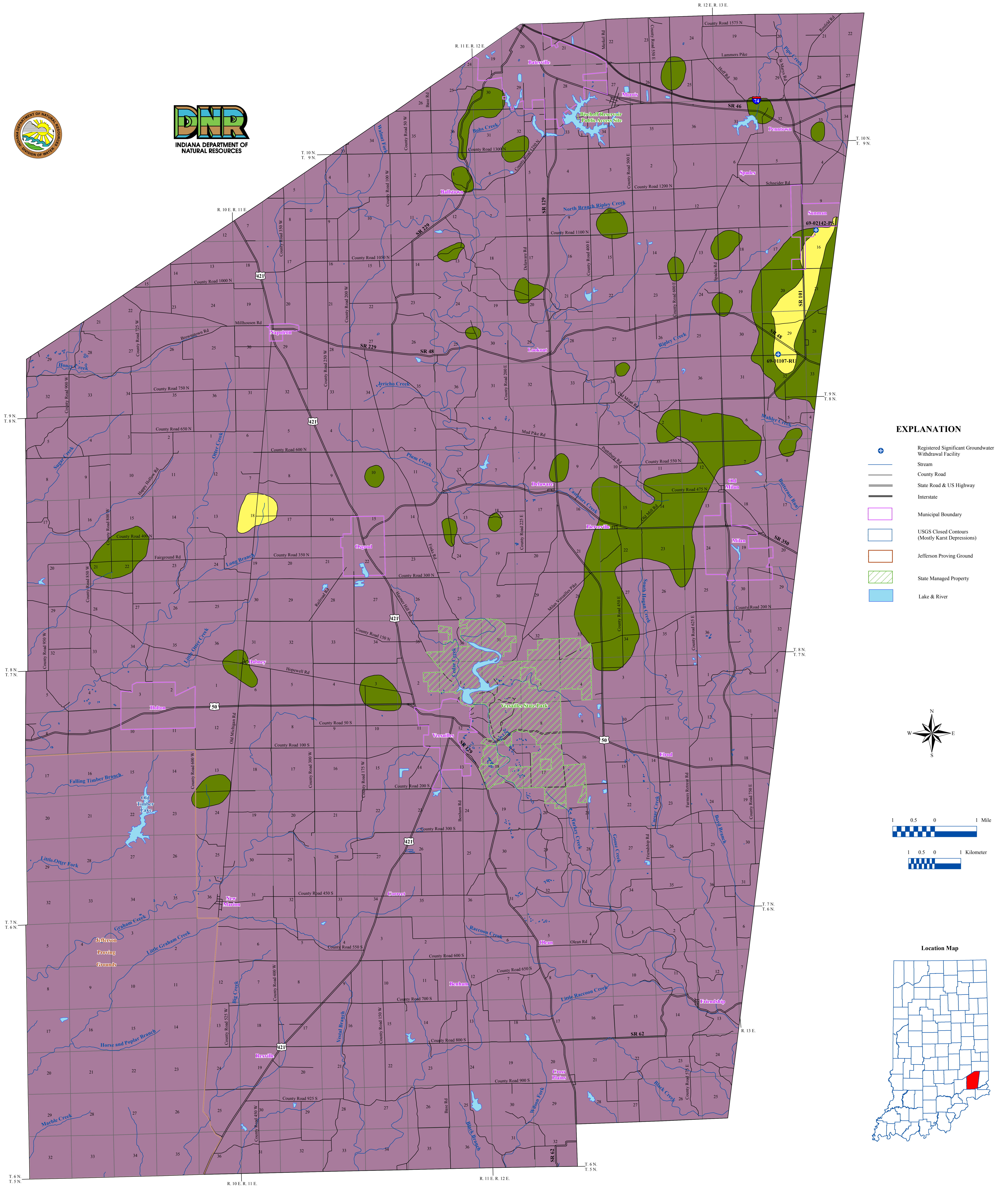
### Bedrock Aquifer Systems of Ripley County, Indiana

by  
Gregory P. Schrader  
Division of Water, Resource Assessment Section

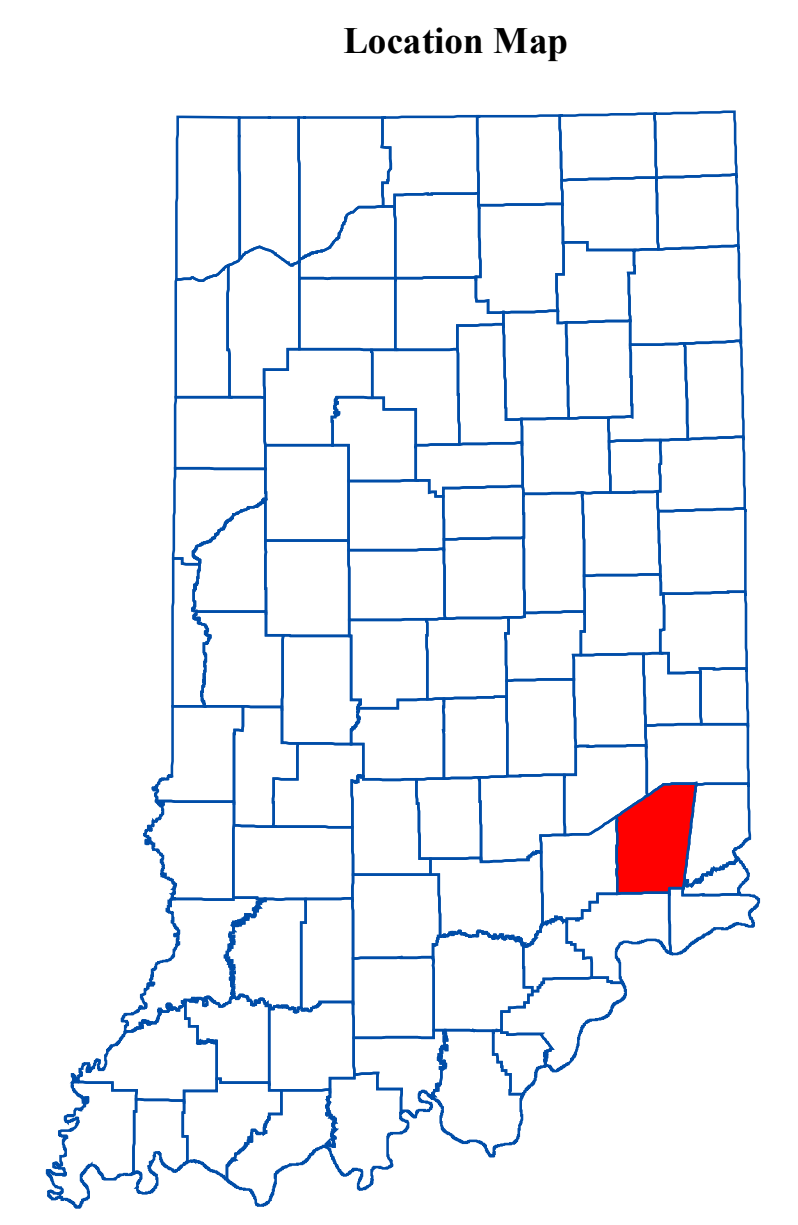
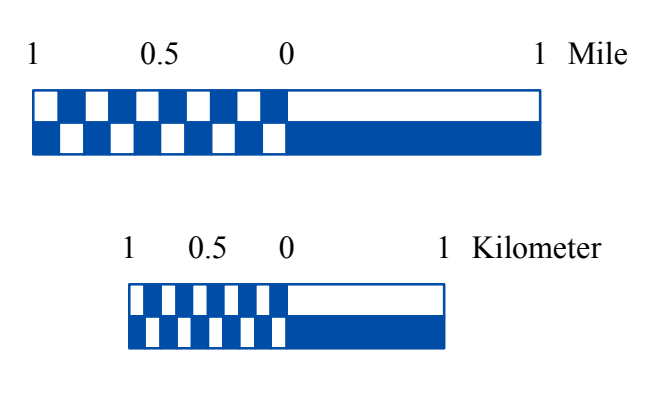
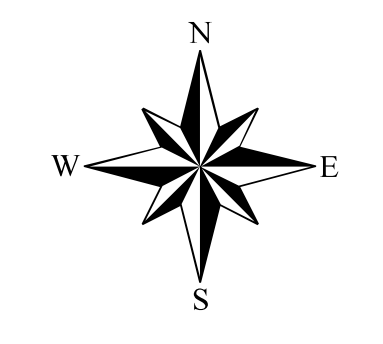
March 2004

Map generated by Jennifer M. Millan  
Updated by Scott H. Dean, 2011  
IDNR, Division of Water, Resource Assessment Section

# UNCONSOLIDATED AQUIFER SYSTEMS OF RIPLEY COUNTY, INDIANA



- EXPLANATION**
- Registered Significant Groundwater Withdrawal Facility
  - Stream
  - County Road
  - State Road & US Highway
  - Interstate
  - Municipal Boundary
  - USGS Closed Contours (Mostly Karst Depressions)
  - Jefferson Proving Ground
  - State Managed Property
  - Lake & River



**Dissected Till and Residuum Aquifer System**

Three unconsolidated aquifer systems have been mapped in Ripley County: the Dissected Till and Residuum, the Muscatuck Plateau / Dearborn Upland Till, and the Muscatuck Plateau / Dearborn Upland Till Aquifer Subsystem. These aquifer systems comprise sediments that were primarily deposited by (or resulted from) glaciers and their meltwaters, or are thin, eroded residuum (a product of bedrock weathering). Boundaries of these aquifer systems are commonly gradational and individual aquifers may extend across aquifer system boundaries. Generally, the most notable physical differences between the aquifer systems in this county are the thickness of saturated aquifer materials and the total thickness of unconsolidated materials.

The thickness of unconsolidated sediments in Ripley County is quite variable. In much of the county, especially in the south, unconsolidated materials overlying bedrock are typically less than 30 feet thick. However, in northeastern Ripley County, because glacial deposits are generally thicker than they are in the rest of the county, the thickness of unconsolidated materials exceeds 110 feet in places.

Regional estimates of aquifer susceptibility to contamination from the surface can differ considerably from local reality. Variations within geologic environments can cause variation in susceptibility to surface contamination. In addition, man-made structures such as poorly constructed water wells, unplugged or improperly abandoned wells, and open excavations, can provide contaminant pathways that bypass the naturally protective clays.

The Dissected Till and Residuum Aquifer System, which covers about 95 percent of Ripley County, has the most limited groundwater resources of the unconsolidated aquifer systems in the county. Unconsolidated materials of this aquifer system predominantly consist of thin, eroded bedrock residuum and pre-Wisconsin tills. Also included in this aquifer system in many stream valleys are relatively thin deposits of alluvium and colluvium. Total thickness of this system in the county typically ranges from about 10 to 50 feet.

There is little potential for water production in the Dissected Till and Residuum Aquifer System in Ripley County. However, this aquifer system is commonly chosen for well development rather than the underlying bedrock. Large-diameter bored (bucket-rig) wells are typically used in this county to produce water from thin sands within the predominantly clay and silt materials of this aquifer system. These sands are commonly less than 2 feet thick; however, in places there are several thin sand seams separated by tills within the saturated zone. Static water levels in this aquifer system are typically between 14 and 26 feet below land surface. Commonly constructed at depths of 30 to 50 feet with 36-inch diameter porous casing, these wells are built to maximize storage. Thus, although these wells typically yield only 0.5 to 3 gallons per minute (gpm), they are generally adequate for livestock and domestic use. The Dissected Till and Residuum Aquifer System is traversed by the Muscatuck Plateau / Dearborn Upland Till Aquifer Subsystem. The boundaries between these systems are transitional in many areas of the county. Because of the generally low permeability of the near-surface materials, this system is not very susceptible to contamination from surface sources.

**Muscatuck Plateau / Dearborn Upland Till Aquifer System**

The Muscatuck Plateau / Dearborn Upland Till Aquifer System is mapped in two small areas in the northern part of Ripley County. The unconsolidated deposits overlying bedrock consist of dominantly pre-Wisconsin glacial materials that range in thickness from 20 to more than 65 feet.

This aquifer system is capable of meeting the needs of domestic and some high-capacity users in Ripley County. Wells in the Muscatuck Plateau / Dearborn Upland Till Aquifer System are completed at depths from 30 to 92 feet. However, most wells are commonly completed with 30-inch diameter porous casing to allow for maximum storage with depths ranging from 35 to 50 feet. Potential aquifer materials within the glacial till include discontinuous intertill sand and gravel units. Individual sand and gravel units within this system typically range from 8 to 30 feet thick capped with 4 to 28 feet of clay. Domestic well yields are typically 10 to 35 gpm and static water levels range from 6 to 24 feet below the land surface. There are 2 registered significant groundwater withdrawal facilities (5 wells) using the Muscatuck Plateau / Dearborn Upland Till Aquifer System. The reported yields for the high-capacity wells range from 150 to 300 gpm.

The Muscatuck Plateau / Dearborn Upland Till Aquifer System has a low susceptibility to surface contamination because intertill sand and gravel units are generally separated from the surface by till layers within the system.

**Muscatuck Plateau / Dearborn Upland Till Aquifer Subsystem**

The Muscatuck Plateau / Dearborn Upland Till Aquifer Subsystem is mapped as several small areas, mostly located in the northern part of Ripley County. The subsystem is mapped similar to the Wabash Lowland Till Aquifer System. However, potential aquifer materials are generally thinner and potential yields are less in the subsystem.

In adjacent counties, this aquifer system is a limited resource, as evidenced by the lack of wells actually producing from the available unconsolidated deposits. However, in Ripley County, nearly all of the reported wells penetrating this system were completed in unconsolidated materials rather than in the underlying bedrock. Potential aquifer materials within the glacial till include discontinuous intertill sand and gravel units. Individual sand and gravel units within this system typically range from 2 to 14 feet thick and are capped with 10 to 40 feet of clay. Wells in the Muscatuck Plateau / Dearborn Upland Till Aquifer Subsystem are commonly completed at depths ranging from 35 to 60 feet with 30-inch diameter porous casing to allow for maximum storage. Static water levels are typically 14 to 28 feet below land surface, so multiple-saturated sand and/or gravel units are commonly utilized in a single well. Domestic wells typically yield from 1 to 10 gpm.

This subsystem is generally not very susceptible to surface contamination because intertill sand and gravel units are generally overlain by thick till deposits. Wells producing from shallow aquifers are moderately to highly susceptible to contamination.

**Map Use and Disclaimer Statement**

We request that the following agency be acknowledged in products derived from this map: Indiana Department of Natural Resources, Division of Water.

This map was compiled by staff of the Indiana Department of Natural Resources, Division of Water using data believed to be reasonably accurate. However, a degree of error is inherent in all maps. This product is distributed "as is" without warranties of any kind, either expressed or implied. This map is intended for use only at the published scale.

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, 20050621), were all from the Indiana Geological Survey and based on a 1:24,000 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. Unconsolidated Aquifer Systems coverage (Schradler, 2004; modified, Scott, 2010) was based on a 1:24,000 scale.

**Unconsolidated Aquifer Systems of Ripley County, Indiana**

by  
 Gregory P. Schradler  
 March 2004  
 Modified by Robert A. Scott  
 January 2010  
 Division of Water, Resource Assessment Section

Map generated by Jennifer McMillan, 2004  
 Updated by Scott W. Dean, 2011  
 IDNR, Division of Water, Resource Assessment Section

# Ripley County

