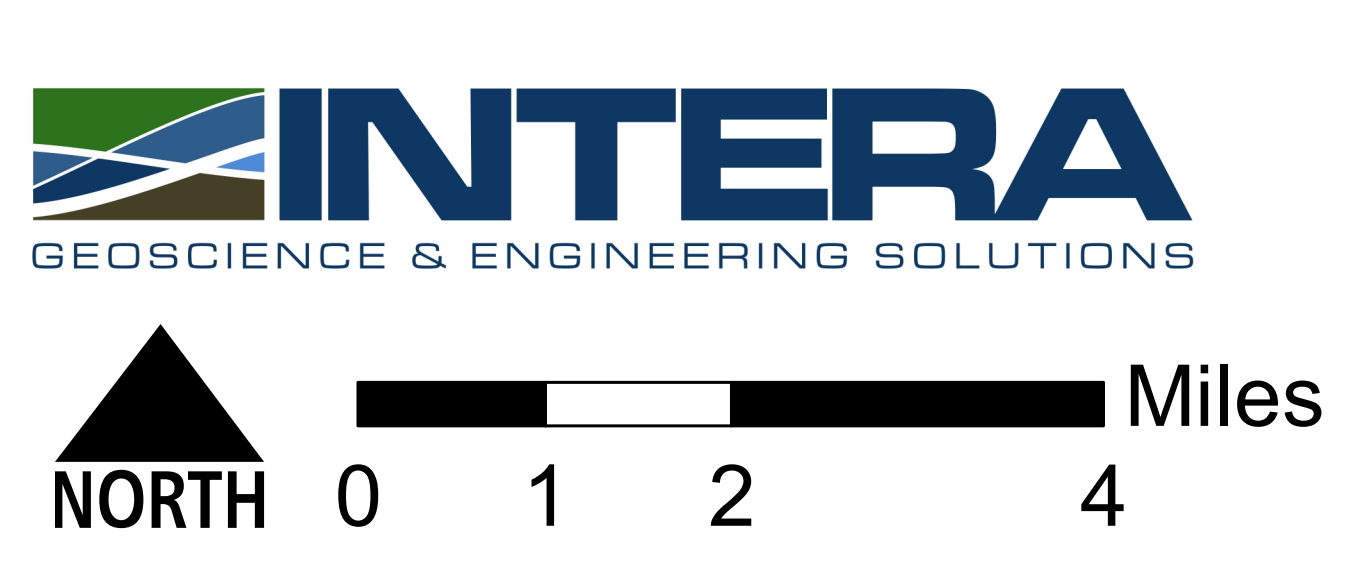
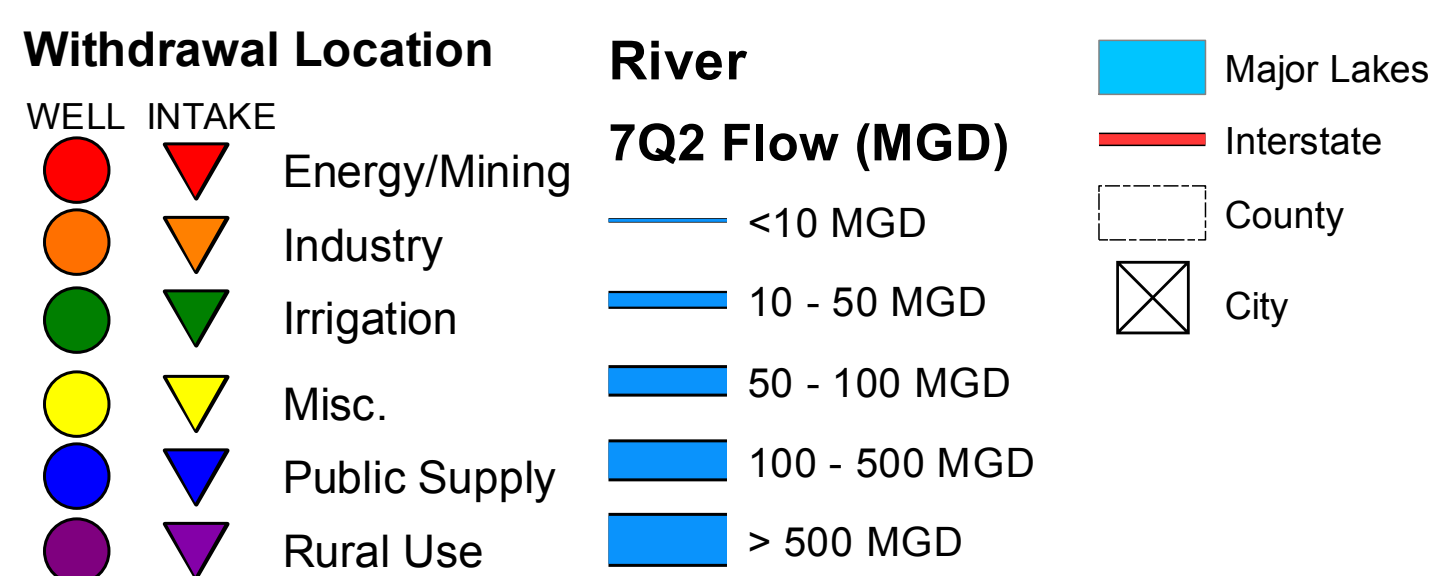
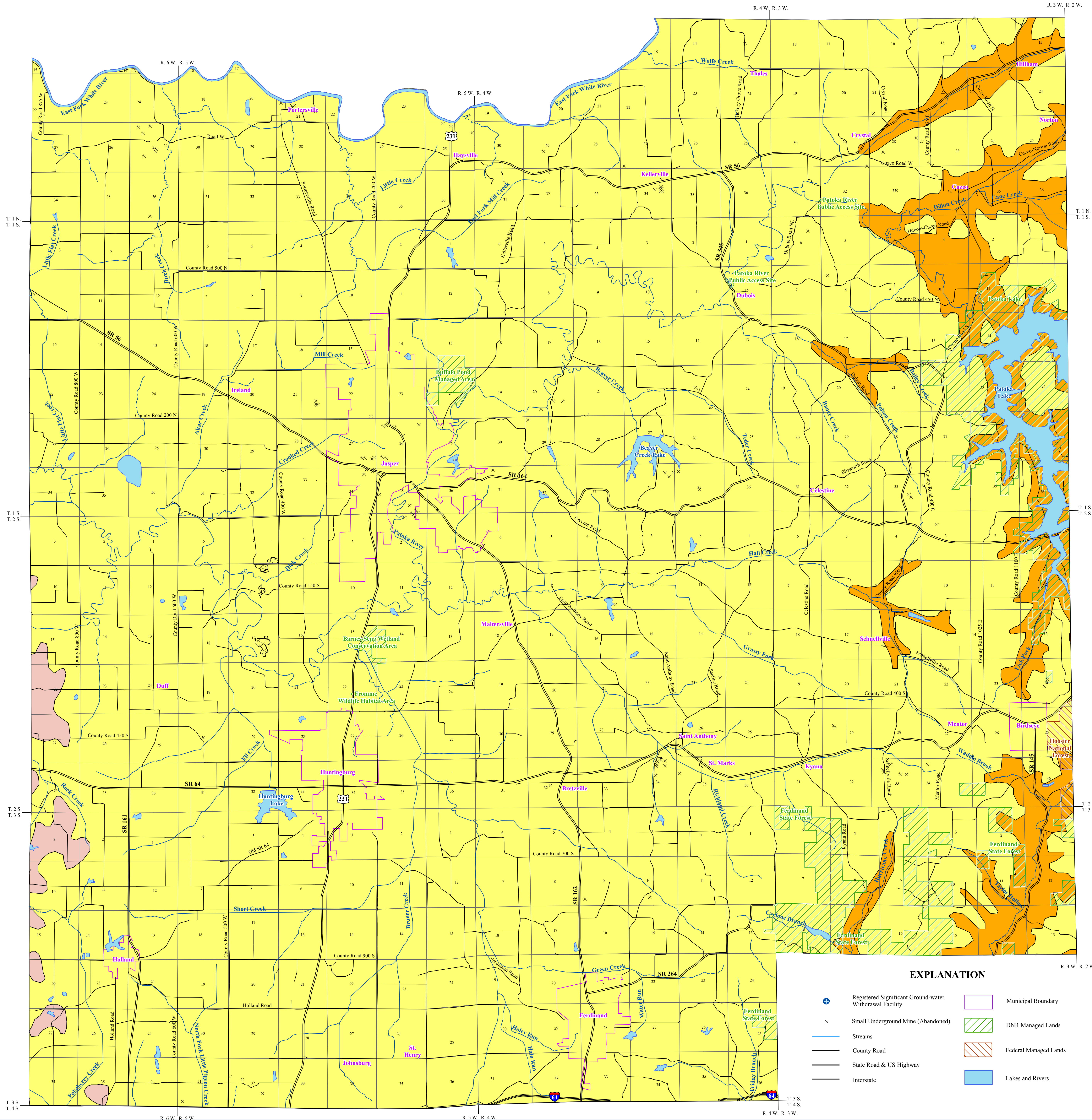


Water Resources and Use in Dubois County

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



BEDROCK AQUIFER SYSTEMS OF DUBOIS COUNTY, INDIANA



Bedrock Aquifer Systems

In Dubois County rock types exposed at the bedrock surface range from relatively unproductive shales to moderately productive limestones and sandstones. Three bedrock aquifer systems are identified for Dubois County based on bedrock surface lithology. 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.

Mississippian-Buffalo Wallow, Stephensport, and West Baden Groups Aquifer System

This Upper Mississippian bedrock aquifer system is limited to a small area in the eastern portion of Dubois County. This aquifer system is laterally discontinuous and has been truncated northward as a result of pre-Pennsylvanian erosion. It is composed primarily of shale, limestone, and sandstone, and consists of three groups. The three groups comprising this bedrock aquifer system differ in their percentages of shale, limestone, and sandstone. Most of the water will be found in the limestone and sandstone beds. Yields for domestic wells typically range from 3 to 15 gpm.

In the outcrop/subcrop area of the Buffalo Wallow, Stephensport, and West Baden Groups the rock is predominantly shallow and contains numerous, irregular joints. In limited areas some karst has developed in the limestone beds. These conditions warrant considering the aquifer system as a whole to be somewhat susceptible to contaminants introduced at and near land surface.

Pennsylvanian-Raccoon Creek Group Aquifer System

Aquifers contained within this Lower Pennsylvanian age bedrock have generally low yielding capability. The outcrop/subcrop of the Raccoon Creek Group covers most of Dubois County. This aquifer system consists, in ascending order of the Mansfield, Brazil, and Stanton Formations. Shale and sandstone compose approximately 95 percent of the group, and clay, coal, and limestone make up nearly all the rest. Shale is more common than sandstone. The sandstone is mostly fine grained.

In general, the Raccoon Creek Group Aquifer System is considered a dependable ground-water source in Dubois County, with many wells producing from the basal sandstone of the Mansfield Formation. Yields for domestic wells typically range from 2 to 10 gpm. Potentially higher yielding wells may be obtained locally for light industrial, irrigation, farm operation, or small municipal usage of up to 50 gpm.

Water quality is generally good, but in areas of surface and underground coal mining, some localized contamination may have occurred. Natural water quality gets progressively worse (more salty) in wells ranging in depth from 250 to 450 feet as the strata dip beneath younger rocks to the southwest.

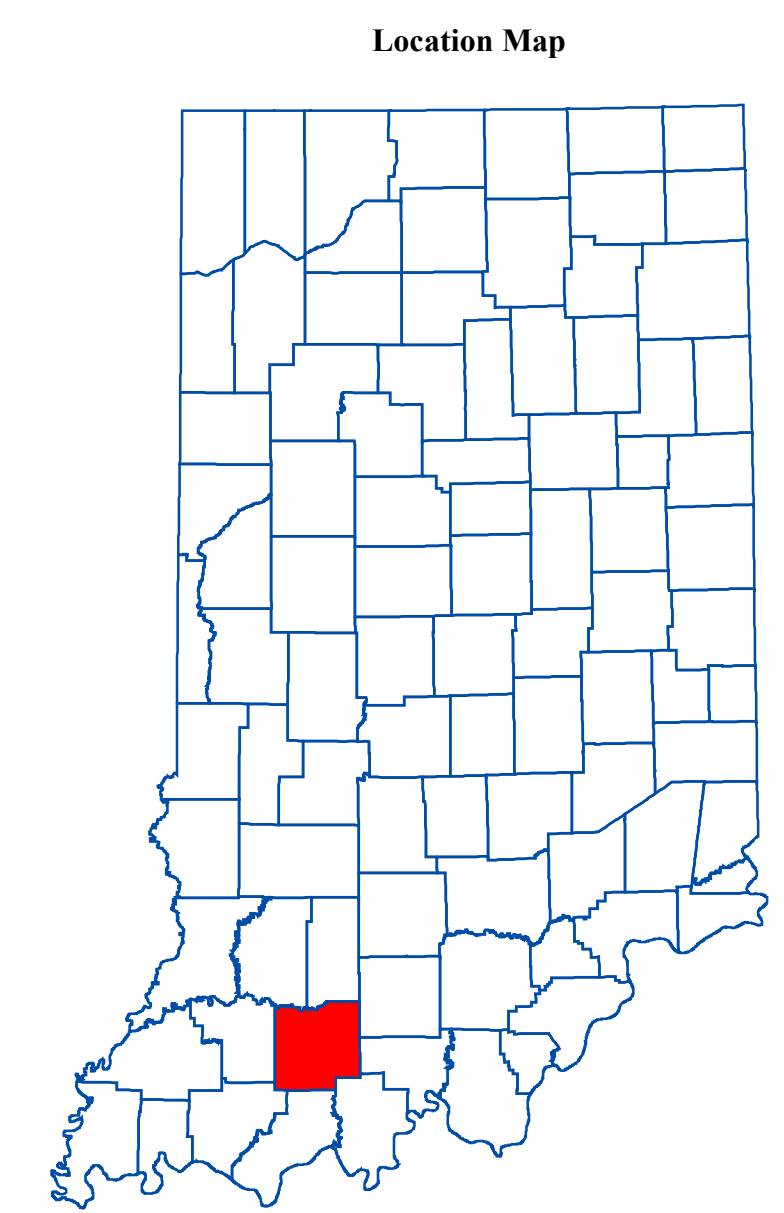
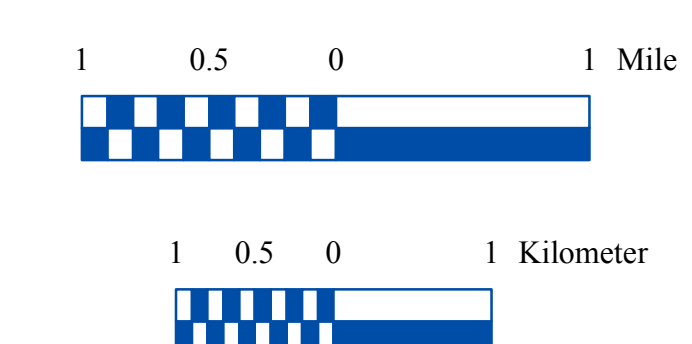
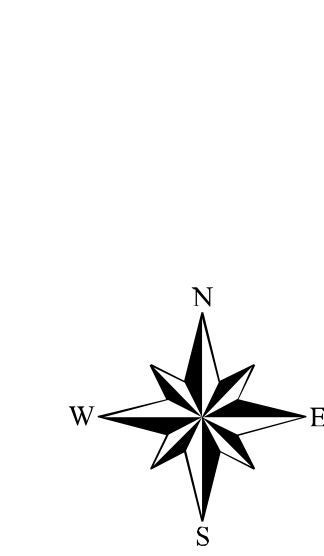
Pennsylvanian-Carbondale Group Aquifer System

This Middle Pennsylvanian bedrock aquifer system consists in ascending order of the Linton, Petersburg, and the Dugger Formations. Most of the thickness of this group consists of variable shales and sandstones with some coal and limestone. The only part of the Carbondale Group present in Dubois County is the Linton Formation. West of Dubois County, where more data from well records are available, the Carbondale Group is considered a minor ground-water source with most wells producing from the thicker sandstone and coal units.

Water quality is generally good and the aquifer system is not very susceptible to contamination from the land surface. However, in areas of surface and underground coal mining, some localized contamination may have occurred. The natural quality of well water gets progressively more mineralized (commonly changing from a calcium-magnesium-bicarbonate type to a sodium bicarbonate or sodium chloride type) as wells are drilled deeper than about 300 feet and the rock strata dip beneath younger rocks to the southwest.

Underground Mine Areas

In these areas various coal seams within the Raccoon Creek Group have been removed by underground mining methods. Approximately 50 percent of the coal seam has been removed, leaving the potential for storage of substantial amounts of water in the larger mines. Although the Division has no records of wells drilled into these mines, yields of a few hundred gpm are possible. A limitation on use of the water could be its more mineralized nature.



EXPLANATION

- Registered Significant Ground-water Withdrawal Facility
- Municipal Boundary
- Streams
- DNR Managed Lands
- County Road
- Federal Managed Lands
- State Road & US Highway
- Lakes and Rivers
- Interstate
- Small Underground Mine (Abandoned)

This map was created from several existing shapefiles. Underground Coal Mines in Southwestern Indiana (polygon shapefile, 20001002), 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 1:500,000 scale. 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.

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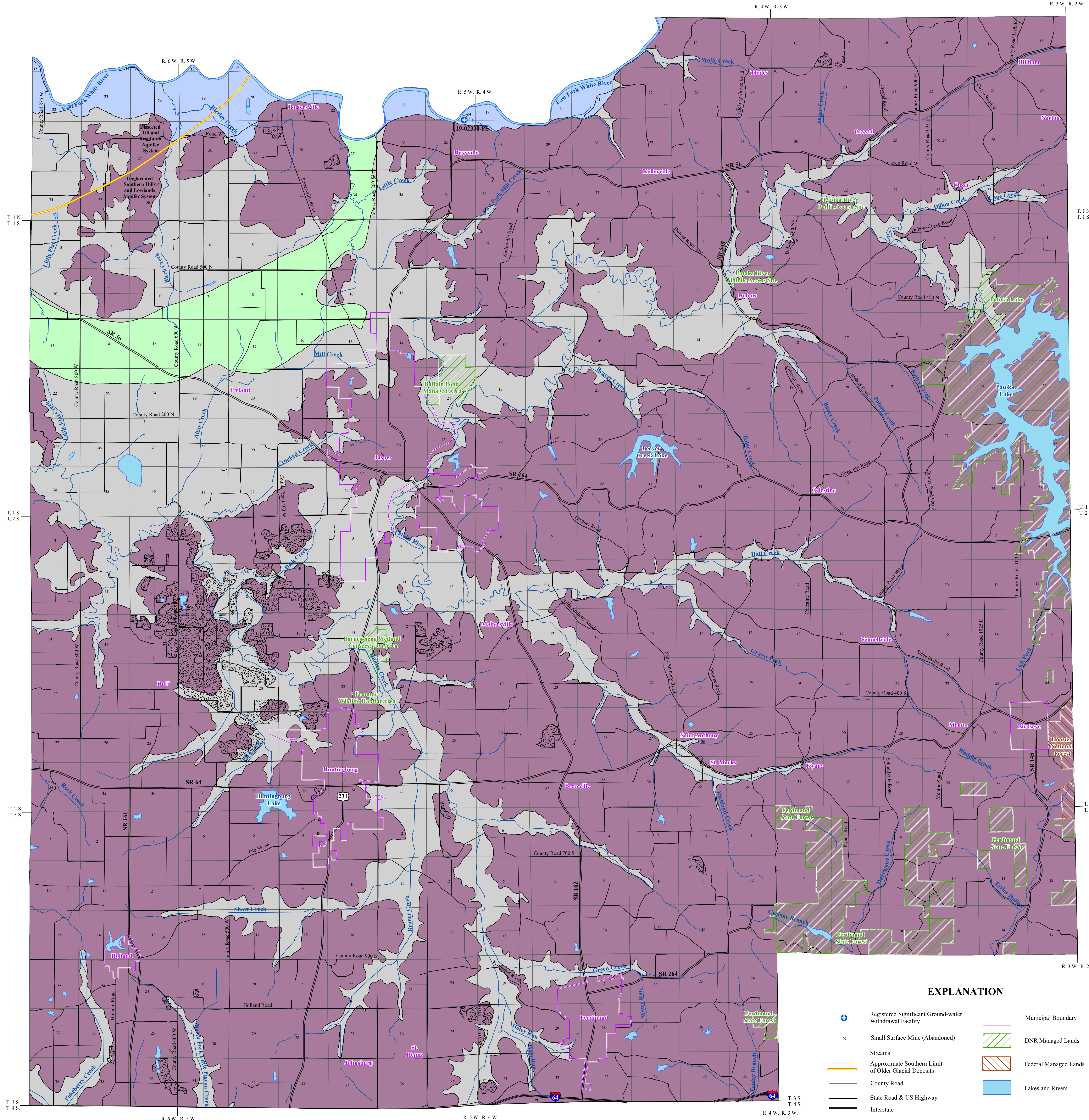
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Bedrock Aquifer Systems of Dubois County, Indiana

by
Glenn E. Grove & William C. Herring
Division of Water, Resource Assessment Section

April 2003

UNCONSOLIDATED AQUIFER SYSTEMS OF DUBOIS COUNTY, INDIANA



Five unconsolidated aquifer systems are mapped in Dubois County. Boundaries are commonly gradational and individual aquifers may extend across aquifer system boundaries. 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. Also, man-made structures such as poorly constructed water wells, unplugged or improperly abandoned wells, and open excavations, can provide contaminant pathways which bypass the naturally protective clays.

Dissected Till and Residuum/Unglacialized Southern Hills and Lowlands Aquifer System

The Dissected Till and Residuum/Unglacialized Southern Hills and Lowlands Aquifer System that covers much of the southern and eastern portions of the county has the most limited ground-water resources of the unconsolidated aquifer systems in the county. Total thickness of this system in the county ranges from about 5 to 50 feet. In most of the county the unconsolidated materials of this system consist of thin, eroded high-clay content bedrock residuum commonly less than 15 feet thick. However, in the north-west quarter of the county the system includes some pre-Wisconsin till, lacustrine silt and clay, and Wisconsin loess that contain a thin (commonly less than 5 feet thick) sand layer in a few places.

With the exception of the north-west quarter of the county, this aquifer system has extremely limited potential for successful wells. Yields for domestic wells typically range from 0 to 5 gallons per minute (gpm). Dry holes are common. Because of the low permeability of the surface materials, this system is not very susceptible to contamination from surface sources.

White River and Tributaries Outwash Aquifer System

The White River and Tributaries Outwash Aquifer system is comprised primarily of surficial valley train sand and gravel and occupies the valleys of the White River and its major tributaries. However, in Dubois County this aquifer is limited to the main valley of the East Fork White River. Sand and gravel deposits in this system range from 20 to more than 81 feet thick, but not all are saturated with water. Actual aquifer thickness is about 18 to 64 feet thick. In some areas the water-bearing units are overlain by fine-grained clay, silt, or muddy sand; therefore the aquifer may be confined or unconfined.

Large-diameter, high-capacity wells are expected to yield 300 to 1,000 gpm. This aquifer system is highly susceptible to contamination in areas that lack overlying clay layers. Areas within the system that are overlain by thick layers of clay or silt are moderately susceptible to surface contamination.

Alluvial, Lacustrine, and Backwater Deposits Aquifer System

The Alluvial, Lacustrine, and Backwater Deposits Aquifer system consists of unconsolidated deposits in valleys tributary to East Fork White River, Patoka River, and Ohio River. Included are deposits in the main valley of Patoka River and deposits occurring over a broad area in northwest Dubois County. The unconsolidated deposits have two sources: alluvium deposited by a stream along with colluvium eroded from valley walls and uplands, and glaciolacustrine deposits formed in bodies of relatively stagnant lake water.

There are areas in this system where the thickness of unconsolidated material exceeds 100 feet, for example in the main Patoka River valley south of Jasper and adjacent to the Buried Valley Aquifer system northwest of Jasper. Very little data are available, but it is expected that wells drilled in these areas may yield sufficient water for domestic needs. Because the Patoka River above Jasper never carried outwash from melting glaciers, it is doubtful that its main valley has potential for much more than domestic wells.

Sand and gravel lenses, where present in this aquifer system, are commonly less than 5 feet thick and are confined within the glaciolacustrine deposits, or are directly overlying bedrock. Yields for domestic wells range from 0 (dry holes) to 60 gpm. Overall, prospects of completing high-capacity wells in this aquifer system are poor. This aquifer system is marked by thick deposits of soft silt and clay that have low susceptibility to surface contamination.

Buried Valley Aquifer System

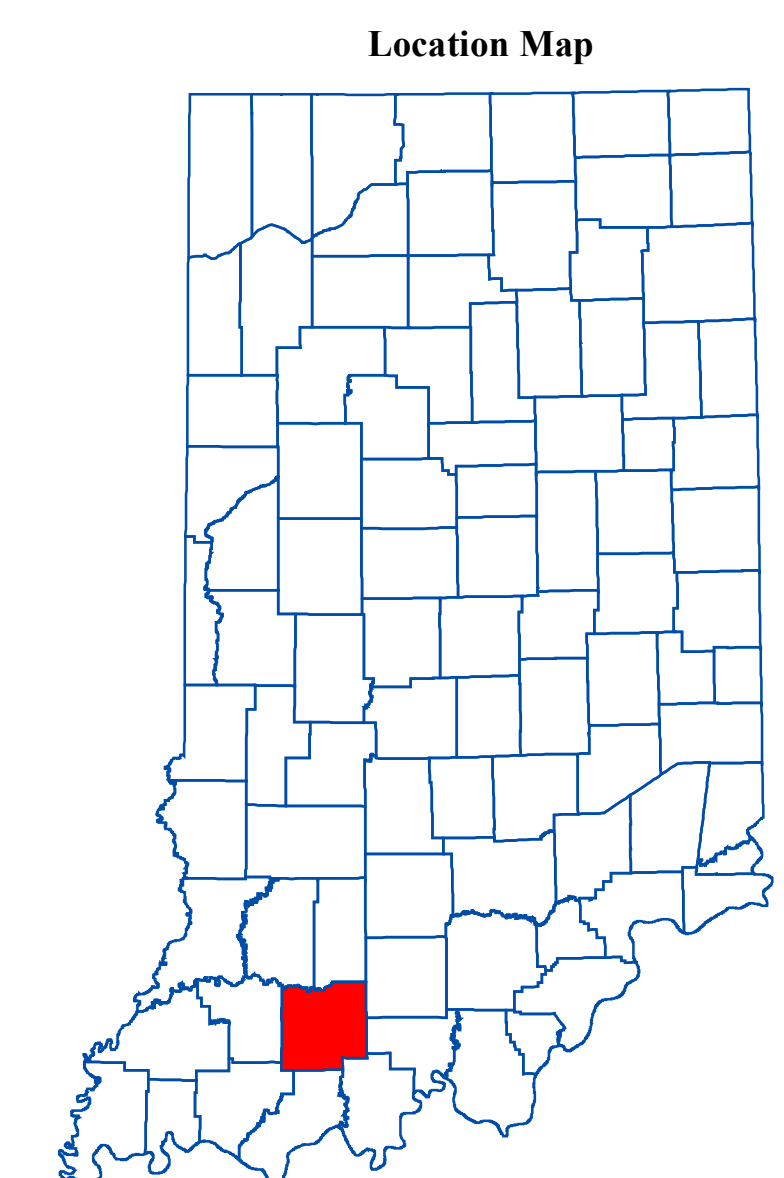
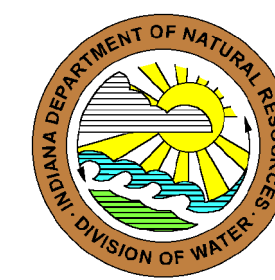
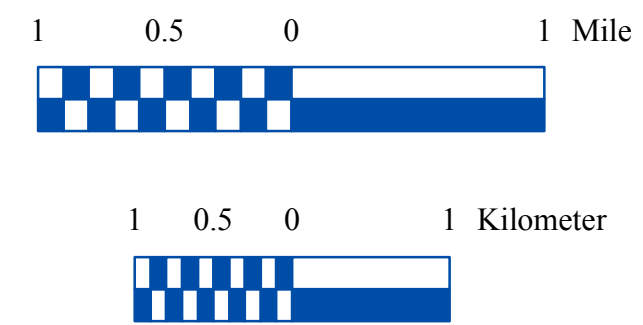
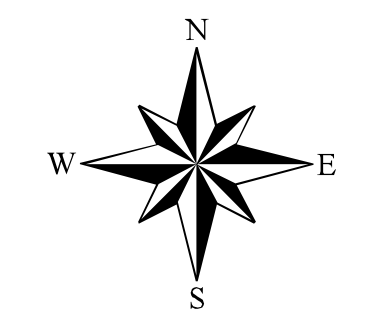
The Buried Valley Aquifer system consists of aquifer materials deposited in pre-glacial bedrock valleys. There is only one significant buried bedrock valley in the county. Domestic wells in this aquifer system typically yield from 5 to 50 gpm. No high-capacity wells are completed in this system and although potential exists for wells yielding up to 200 gpm or more, a major limitation is the fine-grained, dirty nature of the water-bearing sand units occurring in many places.

The Buried Valley Aquifer system has a low susceptibility to surface contamination because tills and lacustrine silts and clays generally overlie outwash sediments occurring within the bedrock valleys. Although lenses of outwash sand and gravel may occur within the silts, the predominance of fine-grained sediments above the bedrock valleys limits the migration of contaminants from surface sources to the deep aquifers.

Coal Mine Spoil Aquifer System

The Coal Mine Spoil Aquifer system covers a small percentage of Dubois County, primarily because the coal seams in the county are too thin and sporadic to be of great commercial significance. This aquifer system was formed during the surface-mining process. The overburden, most of which was originally solid rock, was typically two to ten feet thick and moved aside to uncover the desired coal seam, thus creating a heterogeneous mixture of particles ranging in size from clay, silt, and sand up to gravel, slabs, and boulders. Where extensive, these spoil areas contain considerable amounts of groundwater. Although data are lacking on permeability of these spoil materials, it is generally accepted that the spoil permeability is greater than that for most of the original rock layers above the coal seam mined.

The quality of ground water in this system is generally much poorer than that in the overburden before mining took place. Typically a significant increase occurs in total dissolved solids, especially calcium, magnesium, bicarbonate, and sulfate. High iron, and in places low pH, can also severely limit potential uses of ground water from this system. The Division of Water has no records of any water supply wells completed in this aquifer system in Dubois County.



EXPLANATION

- Registered Significant Ground-water Withdrawal Facility
- Small Surface Mine (Abandoned)
- Streams
- Approximate Southern Limit of Older Glacial Deposits
- County Road
- State Road & US Highway
- Interstate
- Municipal Boundary
- DNR Managed Lands
- Federal Managed Lands
- Lakes and Rivers

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Unconsolidated Aquifer Systems of Dubois County, Indiana

by
Glenn E. Grove & William C. Herring
Division of Water, Resource Assessment Section

March 2003

Dubois County

