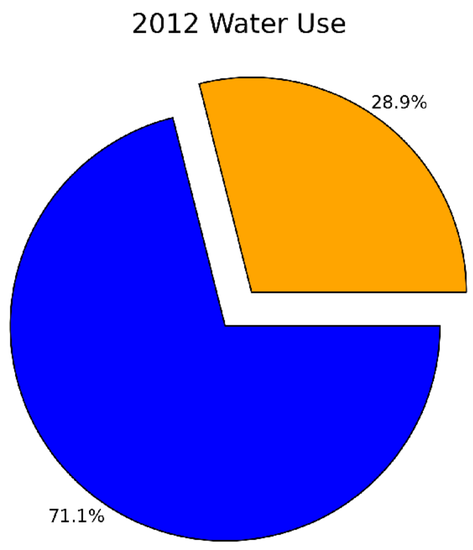
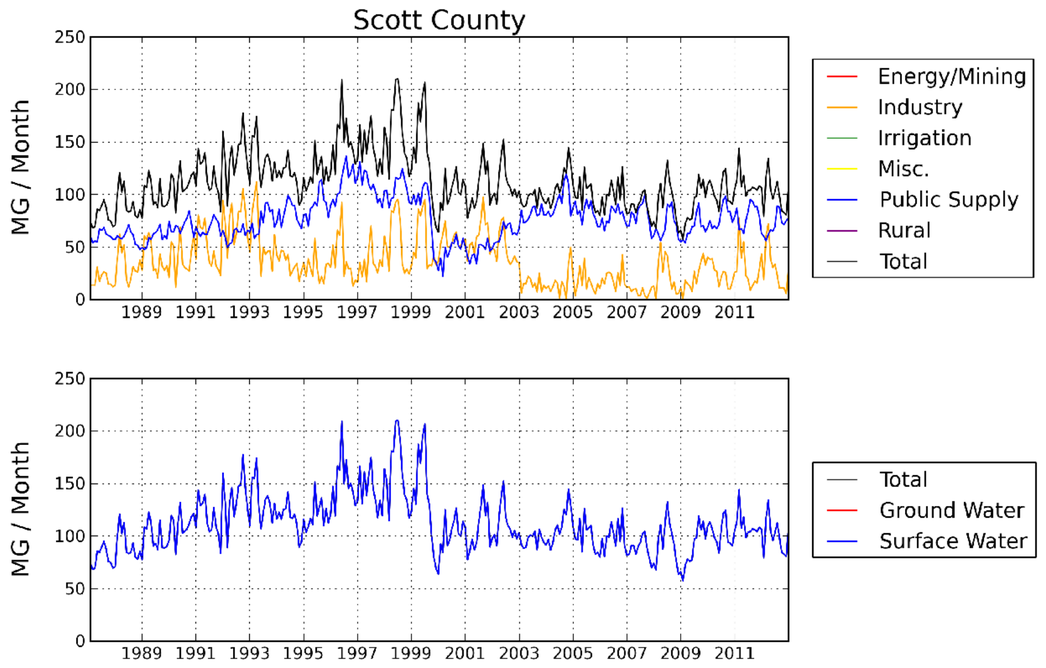
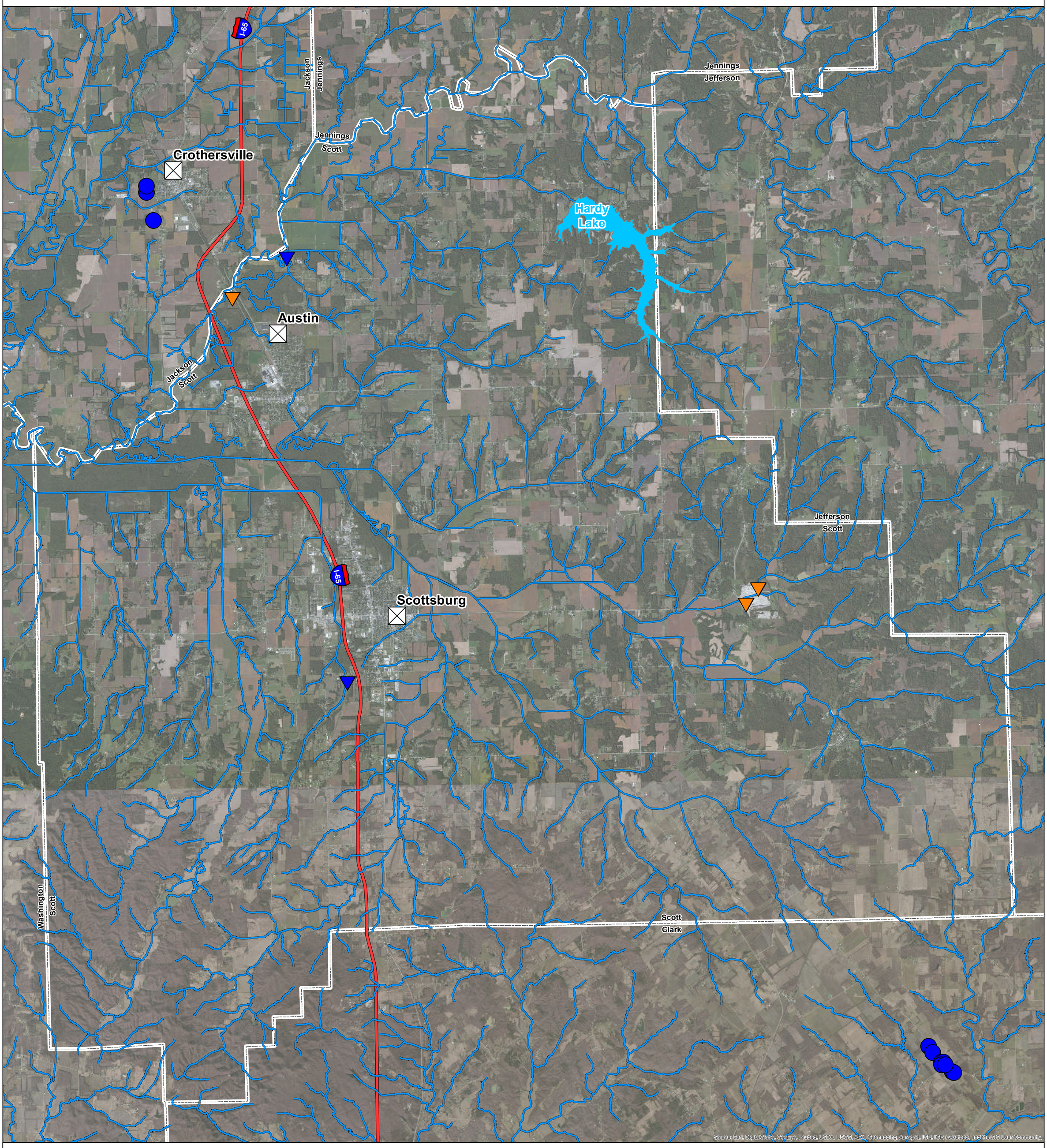


Average Daily Use: 3.3 MGD





Water Resources and Use in Scott 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

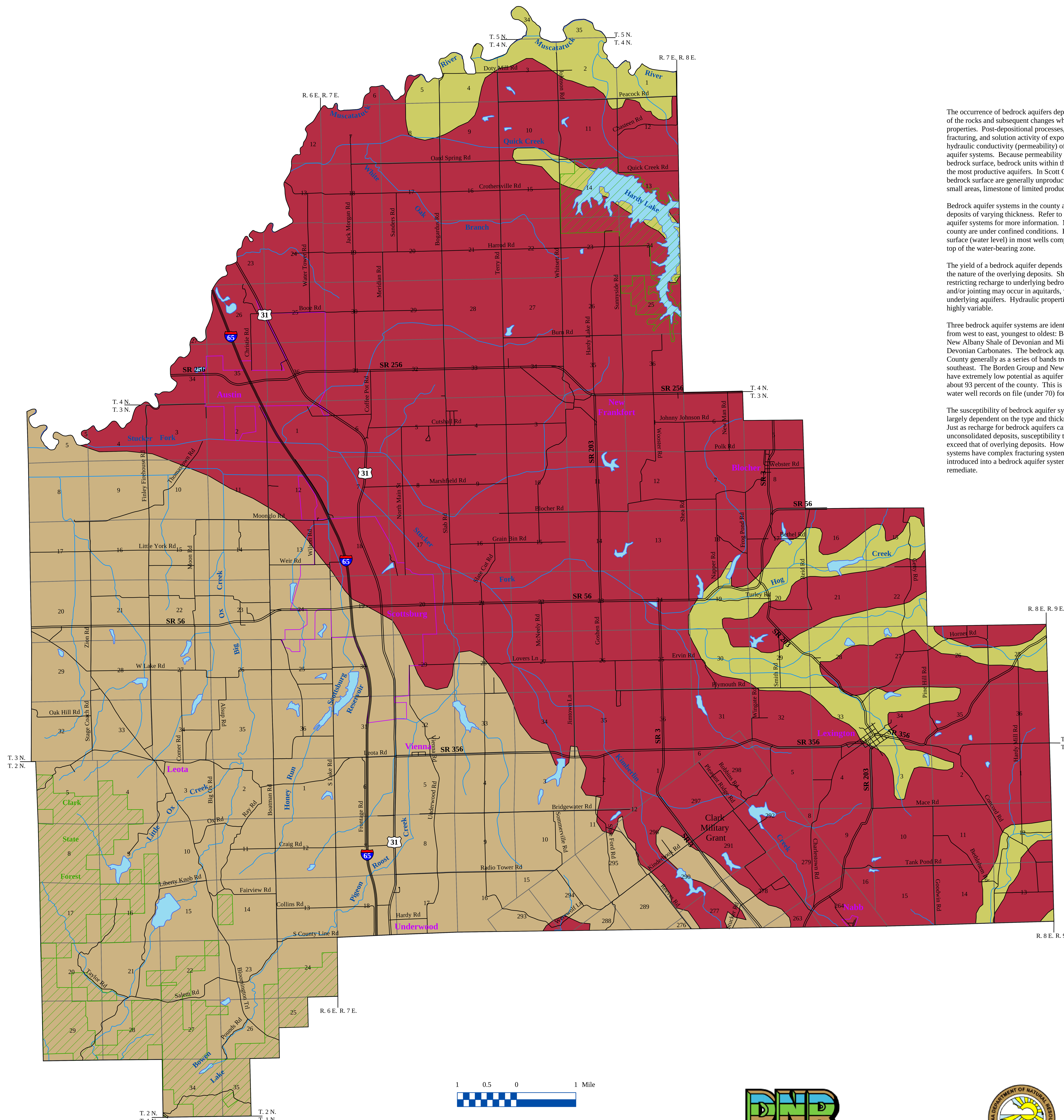
INTERA
GEOSCIENCE & ENGINEERING SOLUTIONS

NORTH

0 1 2 Miles

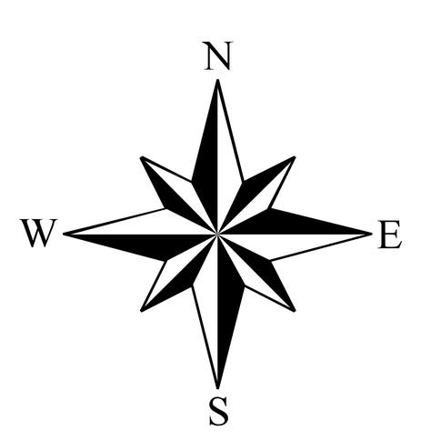
Joseph E. Kernan, Governor
Department of Natural Resources
John Goss, Director

BEDROCK AQUIFER SYSTEMS OF SCOTT COUNTY, INDIANA

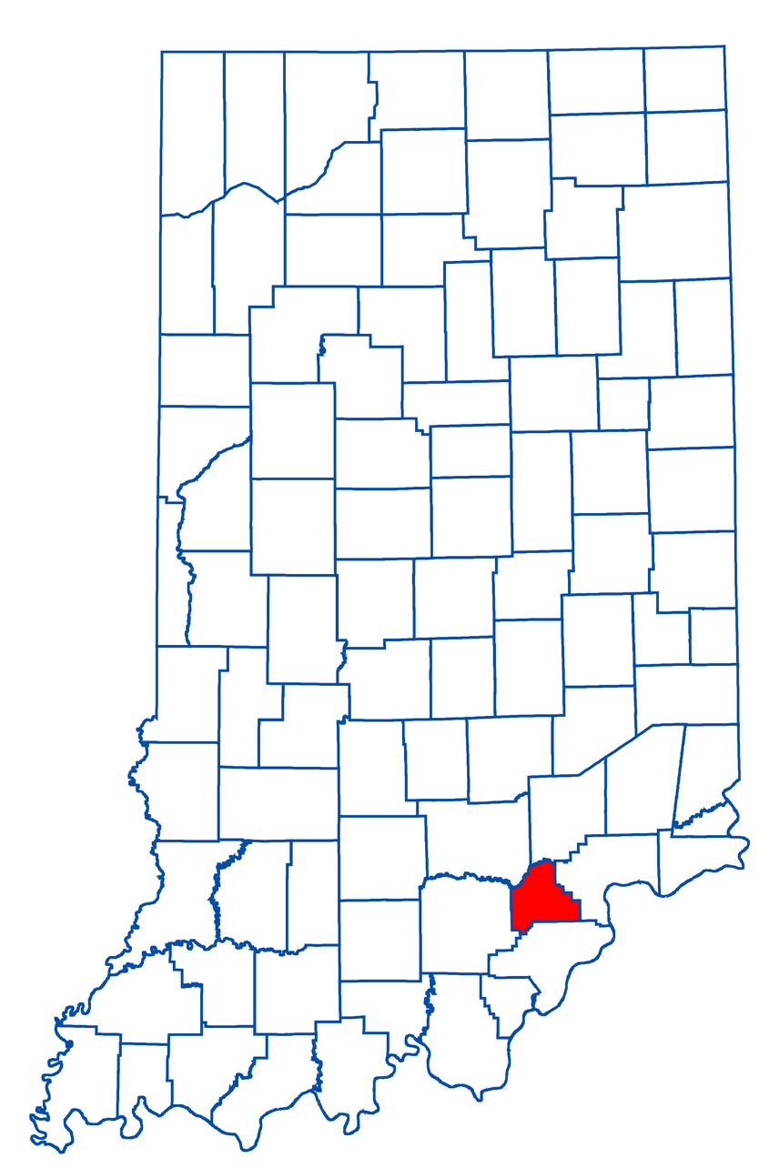


EXPLANATION

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



Location Map



1 0.5 0 1 Mile

1 0.5 0 1 Kilometer

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. In Scott County, rock types exposed at the bedrock surface are generally unproductive shales and siltstones. In very small areas, limestone of limited productivity is exposed at the surface.

Bedrock aquifer systems in the county are overlain by unconsolidated deposits of varying thickness. Refer to the text and map of unconsolidated aquifer systems for more information. 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 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.

Three bedrock aquifer systems are identified for Scott County. They are, from west to east, youngest to oldest: Borden Group of Mississippian age; New Albany Shale of Devonian and Mississippian age; and Silurian and Devonian Carbonates. The bedrock aquifer systems extend across Scott County generally as a series of bands trending north-northwest to south-southeast. The Borden Group and New Albany Shale are considered to have extremely low potential as aquifer systems, and combined they cover about 93 percent of the county. This is reflected in the limited number of water well records on file (under 70) for all of Scott County.

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.

Mississippian -- Borden Group Aquifer System

The outcrop/subcrop area of the Mississippian age Borden Group includes the southwestern third of Scott County, primarily in the hilly areas. This bedrock aquifer system is composed mostly of siltstone and shale, but fine-grained sandstones are common. Carbonates are rare, but do occur as discontinuous interbedded limestone lenses, mostly in the upper portion of the group.

The Borden Group in Scott County has a maximum thickness in excess of 350 feet. Well depths in the Borden Group Aquifer System range from 25 to 552 feet. However, domestic wells are commonly completed at depths of 50 to 100 feet.

Because the Borden Group is generally not very productive, it is typically used only where overlying deposits do not contain aquifer material. The Borden Group is often described as an aquitard, and yields of wells completed in it are typically quite limited. A few wells, however, are able to produce sufficient water for domestic purposes by relying on extra well-bore storage created by drilling relatively large diameter and relatively deep wells. Most domestic wells completed in this aquifer system in Scott County have been reported as dry holes. Additionally, most domestic wells from adjacent counties that were completed in the Borden Group Aquifer System have reported testing rates of less than 5 gallons per minute (gpm).

The Borden Group is composed of primarily fine-grained materials that limit the movement of ground water to fractures, joints, and along the bedrock surface. This, along with the overlying, typically fine-grained clay materials, puts most of the Borden Group Aquifer System in Scott County at low risk to contamination from the surface or near surface sources.

Devonian and Mississippian -- New Albany Shale Aquifer System

The outcrop/subcrop area of the New Albany Shale includes about 56 percent of Scott County, extending in a broad band from the northwest to the southeast corner of the county. The New Albany Shale is primarily Devonian age, except for the upper few feet that are Mississippian age. The total thickness of the New Albany Shale ranges from 0 at its eastern outcrop to a maximum of about 120 feet near Austin in the northern part of the county.

The New Albany Shale Aquifer System in Scott County is a limited aquifer resource. This aquifer system consists mostly of brownish-black carbon-rich shale, greenish-gray shale, along with minor amounts of dolomite and dolomitic quartz sandstone.

Although a few wells produce water from the New Albany Shale, the formation is not considered a significant aquifer in the county. Most drillers will penetrate the New Albany Shale, case it off, and continue drilling into the underlying Devonian limestones. Most wells greater than 75 feet penetrate into the underlying Devonian limestones. Domestic well depths range from 54 to 225 feet, but are generally completed at depths between 75 and 125 feet. Reported yields typically range from 0 to 5 gpm with drillers reporting many dry holes.

Water quality in this aquifer system in Scott County is generally satisfactory for domestic use. However, a few drillers report “sulfur water” in scattered wells within the outcrop/subcrop area of the New Albany Shale. This aquifer system typically has 10 to 25 feet of fine-grained materials (clay, silt, or residuum) that overlie bedrock and it is not considered very susceptible to surface contamination.

Silurian and Devonian Carbonates Aquifer System

The outcrop/subcrop area of the Silurian and Devonian carbonate rocks covers about 7 percent of Scott County. Limestone of the Muscatatuck Group is exposed in a few stream valleys and adjacent lowlands in the eastern third of the county. The maximum thickness of the Silurian and Devonian carbonates is about 200 feet where overlain by the New Albany Shale in the western part of the county.

This aquifer system is composed primarily of limestone and dolomite with some interbedded shale units. Because most individual units of the Silurian and Devonian systems 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.

The elevations of water-bearing zones in this aquifer system vary substantially. Water well data from other counties indicate that the most productive part of the carbonate aquifer commonly occurs within the upper 100 feet, and in many places, within a few feet of the bedrock surface. However, other zones of relatively high permeability do occur at greater depth.

Although it is not a major resource in the county, the Silurian and Devonian Carbonates Aquifer System is the most productive bedrock aquifer system and could meet most domestic needs. However, the water quality may be very poor, especially in the western half of the county, where the New Albany Shale overlies this system. In the outcrop/subcrop area of this aquifer system the depth to the bedrock surface is generally less than 50 feet in Scott County. Well depths range from 33 to 115 feet. Reported testing rates vary from 0 (dry hole) to 40 gpm, but would typically range between 1 and 10 gpm based on well records from adjacent counties. Static water levels range from 0 to 80 feet below the land surface, but are typically between 10 and 35 feet.

This aquifer system in Scott County is generally not very susceptible to contamination from the land surface, except in limited areas where the overlying New Albany Shale and/or clay-rich till and residuum is thin or absent.

Map generated by Jennifer Mc Millan and Joseph L. Phillips
IDNR, Division of Water, Resource Assessment Section

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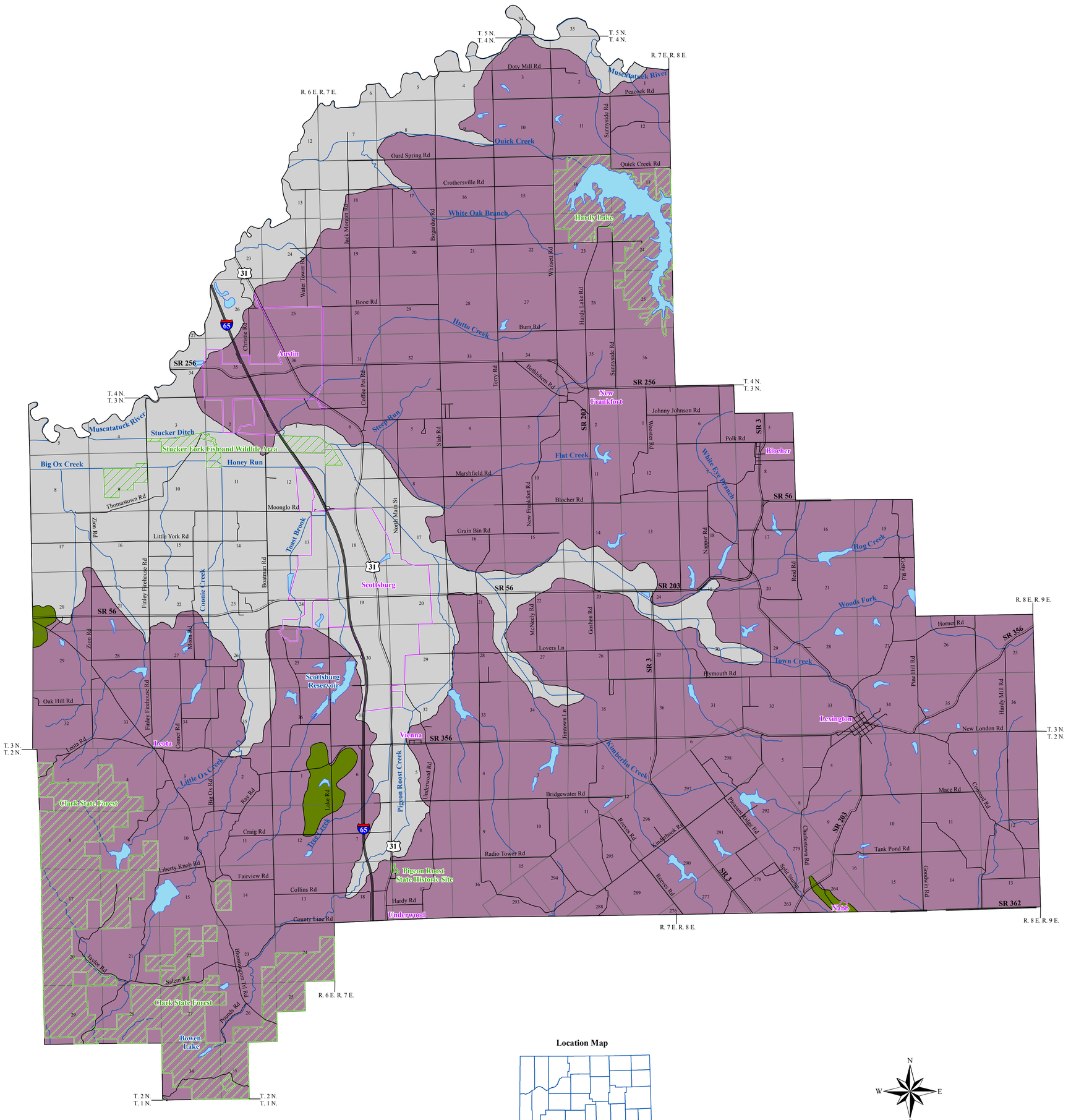
This map was created from several existing shapefiles. Township and Range Lines of Indiana (line shapefile, 20020621), Land Survey Lines of Indiana (polygon shapefile, 20020621), County Boundaries of Indiana (polygon shapefile, 20020621) was from the Indiana Geological Survey and based on a 1:24,000 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 Scott County, Indiana

by
Glenn E. Grove
Division of Water, Resource Assessment Section

July 2004

UNCONSOLIDATED AQUIFER SYSTEMS OF SCOTT COUNTY, INDIANA



Three unconsolidated aquifer systems have been mapped in Scott County: the Dissected Till and Residuum; the Alluvial, Lacustrine, and Backwater Deposits; and the Scottsburg Lowland / Muscatatuck Plateau Till Subsystem. The first system includes relatively thin deposits left by continental ice sheets as well as eroded residuum (a product of bedrock weathering). The next two systems comprise sediments deposited by, or resulting from, glaciers, glacial meltwaters, and post-glacial precipitation events. Boundaries of these aquifer systems are commonly gradational and individual aquifers may extend across aquifer system boundaries.

Although the entire county was glaciated during pre-Wisconsin times, the thickness of unconsolidated sediments in Scott County is quite variable. Unconsolidated materials overlying bedrock are less than 25 feet thick in much of the county and are typically less than 10 feet thick on the hills in the southwestern corner. However, along the northern and northwestern county boundaries, particularly in the floodplains of the Muscatatuck River and major tributaries, the thickness of unconsolidated deposits commonly ranges from 30 to 50 feet. Sand and gravel aquifers are expected at the base of the thicker unconsolidated materials in the main valley of the Muscatatuck River and major tributaries. Seismic and water well record data from adjacent counties indicate that unconsolidated deposits may be 30 to 40 feet thick in the broad flat uplands in several locations in the county.

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.

Dissected Till and Residuum Aquifer System

The Dissected Till and Residuum Aquifer System, which is mapped in about 78 percent of Scott 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 and thin outwash terraces. Also included in many of the stream bottoms of this aquifer system are relatively thin deposits of alluvium, colluvium, and lacustrine materials.

Total thickness of this system in Scott County typically ranges from about 10 to 40 feet. The thickest deposits, based on seismic data, are over 50 feet thick on the upland ridges north of Quick Creek. However, in most other locations the unconsolidated materials covering the bedrock are so thin the aquifer elevations are approximately equal to the bedrock surface. The bedrock surface varies in elevation from about 500 feet above mean sea level (m.s.l.) south of Austin near Stucker Ditch to over 1020 feet m.s.l. in the hills around Bowen Lake southwest of Underwood.

There is little potential for water production in the Dissected Till and Residuum Aquifer System in Scott County and several dry holes have been reported. Because the aquifer system is typically very thin, all reported wells penetrating this aquifer system in the county are developed in the underlying bedrock. However, in places large-diameter bored (bucket-rig) wells may produce water from thin sands within the predominantly clay and silt materials of this aquifer system. Because of the generally low permeability of the near-surface materials, this system is not very susceptible to contamination from surface sources.

Alluvial, Lacustrine, and Backwater Deposits Aquifer System

In Scott County the Alluvial, Lacustrine, and Backwater Deposits Aquifer System consists of unconsolidated deposits in the valleys of the Muscatatuck River and its larger tributaries, including Stucker Ditch. The unconsolidated deposits in this aquifer system come from two sources. The primary source is glaciolacustrine deposits that were formed in bodies of relatively stagnant lake water and are marked by soft silt and clay. A secondary source is alluvium, and perhaps some old outwash, deposited by the streams along with colluvium eroded from the valley walls and upland areas. The lake deposits were formed when the valley of the East Fork White River was choked with coarser material carried by glacial meltwater. Thick deposits of this material effectively dammed tributary streams, creating lakes. Thick deposits of silt, sometimes called "slackwater clay," mark the former locations of these glacial lakes. These lacustrine deposits are noted on Quaternary geology maps and soil maps.

The total thickness of unconsolidated deposits (mostly clay and silt) in this aquifer system varies considerably, from about 25 feet to more than 60 feet. The thickest deposits exist in the floodplain south of Stucker Ditch, where sequences of glacial outwash and lacustrine deposits have been stacked above a deep part of a buried bedrock valley. The thickness of permeable sand or gravel zones (where present) is typically between 5 and 10 feet, but may exceed 15 feet in a few isolated places. Most of the permeable zones are composed of fine-grained sand. The overall scarcity of productive zones of sand and gravel in this aquifer system is apparent from the number of water wells completed in the underlying bedrock aquifers. Although very few water well records are available, it is expected that many wells drilled in this system (especially bucket-rig wells) may yield sufficient water for domestic needs.

This aquifer system is marked by thick deposits of soft silt and clay that have low susceptibility to surface contamination.

Scottsburg Lowland / Muscatatuck Plateau Till Aquifer Subsystem

The Scottsburg Lowland / Muscatatuck Plateau Till Aquifer Subsystem is mapped in a few small areas. These areas are located south and west of Scottsburg and near the town of Nabb in southeastern Scott County. Due to extremely limited water well data, mapping is primarily based on geology, topography, soil types, field observations, and water well data from adjacent counties. Because of the scarcity of water well data for this aquifer system in the county, boundaries with other aquifer systems cannot be defined with a high degree of confidence.

The unconsolidated deposits in this system predominantly consist of pre-Wisconsin glacial materials that range in thickness from about 25 to more than 45 feet. In places, this system is also covered by younger lacustrine deposits of Wisconsin age. The area mapped around Nabb is based on field observations of stream flow, soil types, and the area's geologic and topographic characteristics, which are similar to an area supporting a public water supply well field in Clark County (Washington Township Water Corporation) about 3 miles to the southeast.

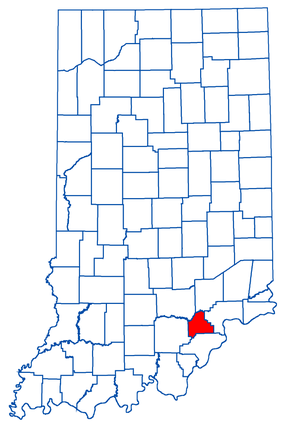
In Scott County, this aquifer system is expected to be a better resource than the Dissected Till and Residuum Aquifer System. Potential aquifer materials within the glacial till include discontinuous intratill sand and gravel units. The Division of Water has a record for only one water well completed in this system and the well driller described a seam of gravel 5 feet thick. Well yields would be expected to be quite variable. Because sand and gravel zones are not expected to be very thick in much of the aquifer system, large diameter bored wells may be needed in places to increase the yield to an acceptable amount for domestic purposes.

The Scottsburg Lowland / Muscatatuck Plateau Till Aquifer Subsystem has a low susceptibility to surface contamination because intratill sand and gravel units are generally separated from the surface by till layers.

EXPLANATION

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

Location Map



N
W E
S

1 0.5 0 1 Mile

1 0.5 0 1 Kilometer

INDIANA DEPARTMENT OF NATURAL RESOURCES

INDIANA DEPARTMENT OF NATURAL RESOURCES · DIVISION OF WATER

Map generated by Jennifer Mc Millan and Joseph L. Phillips
IDNR, Division of Water, Resource Assessment Section

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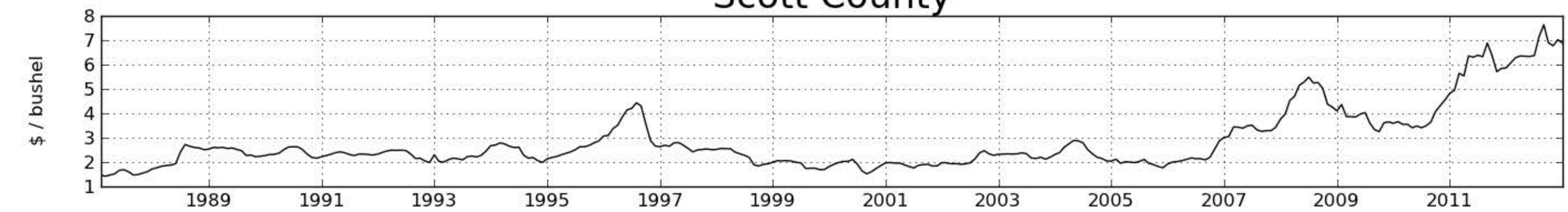
Unconsolidated Aquifer Systems of Scott County, Indiana

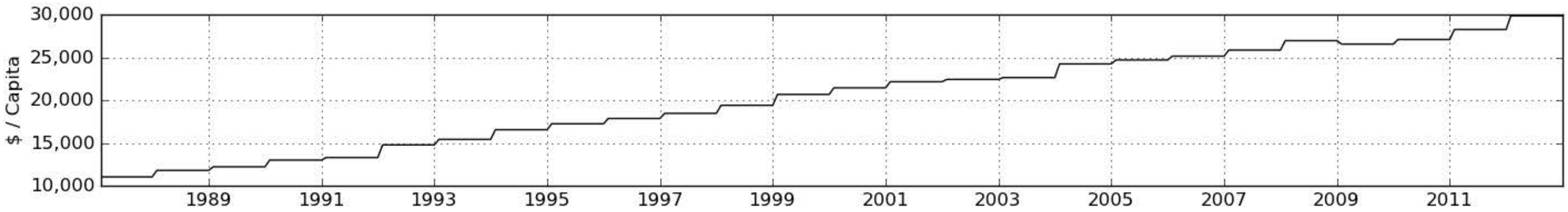
by
Glenn E. Grove
Division of Water, Resource Assessment Section

July 2004

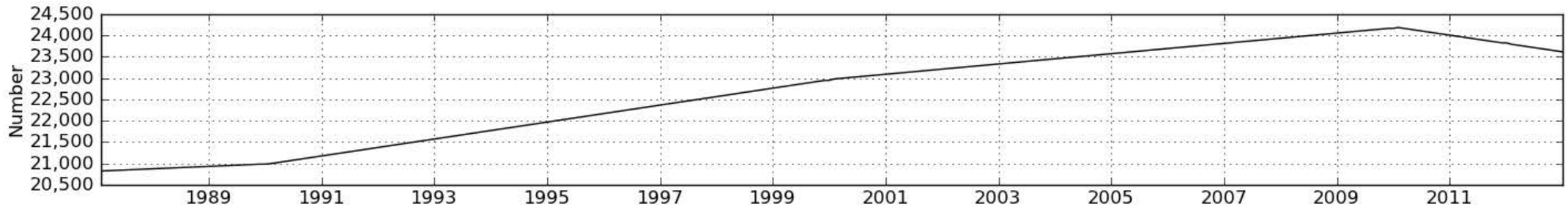
Scott County



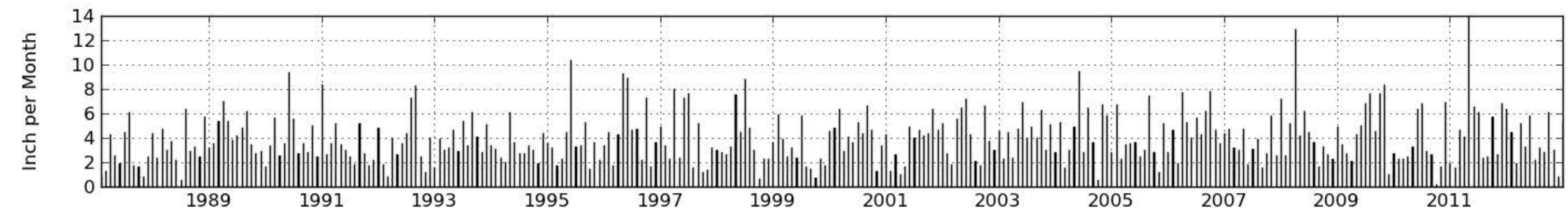
Corn Price



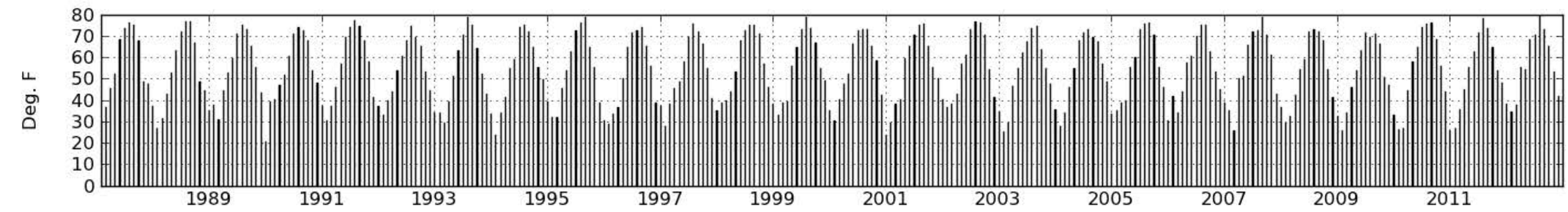
Income



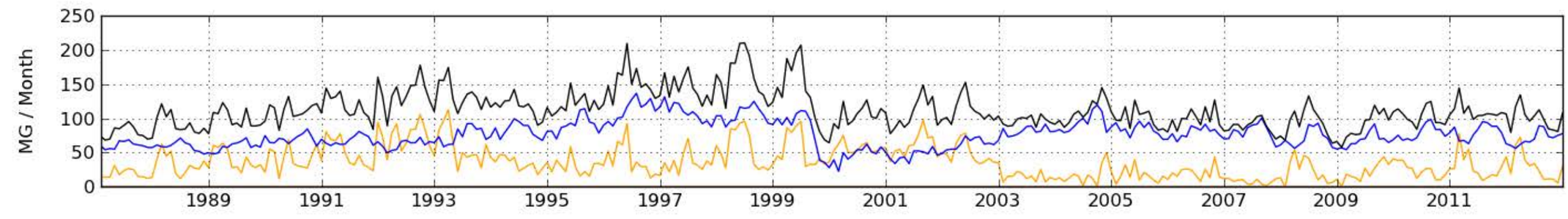
Population



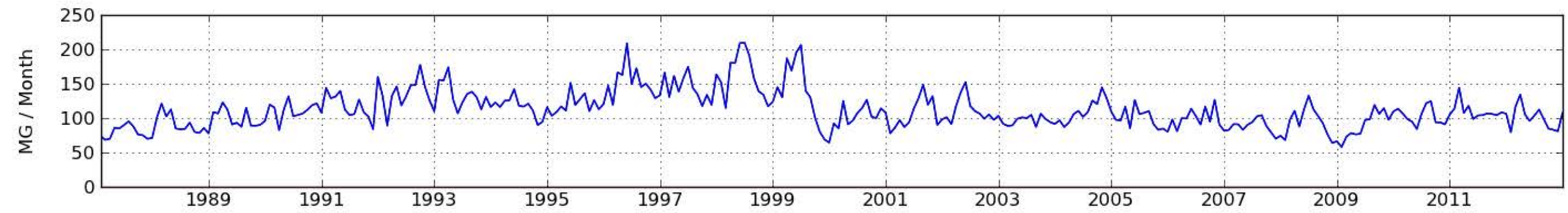
Precipitation



Temperature



Energy/Mining
Industry
Irrigation
Misc.
Public Supply
Rural
Total



Total
Ground Water
Surface Water