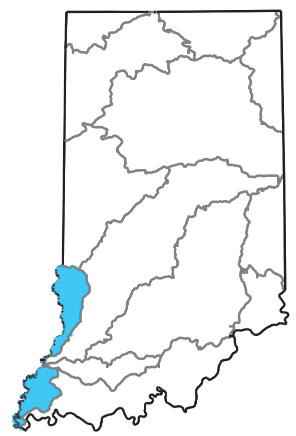


LOWER WABASH RIVER BASIN

By Keith E. Bobay

General Description

The Lower Wabash River basin incorporates the drainage basin of the Wabash River between Honey Creek in Vigo County and the mouth of the Wabash River at the Ohio River in Posey County (fig. 48). The basin has an area of 1,339 mi^2 (Hoggatt, 1975) and includes most of Sullivan and Posey Counties, plus parts of Vigo, Greene, Knox, Gibson, and Vanderburgh Counties in southwestern Indiana. The major cities and towns in the basin are Vincennes, Sullivan, and Princeton.

Previous Studies

The ground-water resources of the counties in the Lower Wabash River basin were described by Harrell (1935). Watkins and Jordan (1962, 1963) made a preliminary evaluation of ground water in Sullivan County and Vigo County. They reported lithologic descriptions and published drillers' logs, well-construction and aquifer information, and water-quality analyses. Cable and others (1971) further described the hydrogeology of the principal aquifers in Vigo and Clay Counties. They mapped the bedrock geology and topography, the surficial geology, and the location and potentiometric surface of the major unconsolidated aquifers in the two counties. Cable and Robison (1973) described the hydrogeology of the principal aquifers of Sullivan County. Robison (1977) reported on the ground-water resources of Posey County. He described the sources and potential yield of the principal aquifers in the county and summarized the chemical quality of the ground water. In addition, he mapped the surficial geology and the bedrock topography of the county, as well as the topography of the Inglefield Sandstone. Cable and Wolf (1977) reported on the ground-water resources of Vanderburgh County. They mapped the areal extent, thickness, and surface topography of the Inglefield Sandstone aquifer in the Big Creek watershed (fig. 48). They also reported production potential and salinities of ground water from the major bedrock aquifers in the county.

Smith and Krothe (1983) evaluated the hydrogeology of the Carbondale and Raccoon Creek Groups of the Pennsylvanian System in the northern part of the Lower Wabash River basin. They reported transmissivities and the chemical quality of the sandstone and coal aquifers, and they mapped the potentiometric surface of the sandstone aquifers in the Brazil, Staunton, Linton, and Petersburg Formations. Glore (1970) and Wier and others (1973) studied the aquifer potential of the Middle Pennsylvanian sandstones of the Busseron Creek watershed in Sullivan County. Barnhart and Middleman (1990) studied the hydrogeology of Gibson County. They reported well yields and thicknesses of the bedrock aquifer formations and of the unconsolidated aquifers. They also mapped the topography of certain sandstone formations and reported the results of water-quality analyses. Clark (1980) mapped the potential yield of ground water from properly constructed large-diameter wells.

Shedlock (1980) mapped the thickness, distribution, and potentiometric surface of the glacial outwash aquifer in a 56-mi^2 area near Vincennes, Ind. Many authors (Wier, 1952a, 1952b, 1954; Friedman, 1954; Waddell, 1954; Wier and Powell, 1967; Tanner and others, 1981a, 1981b, 1981c; Smith and Krothe, 1983) have mapped the thickness and structure of the major Pennsylvanian coal seams in southwestern Indiana.

Physiography

The Lower Wabash River basin is part of the Wabash Lowland physiographic unit (Malott, 1922, p. 102; Schneider, 1966, p. 48) which is shown in figures 2 and 49. The Lower Wabash River valley is a broad, flat glacial drainage channel that includes winding channels, a wide flood plain, and adjacent terrace levels. The valley floor ranges from 3 to 10 mi in width. Local relief on the valley floor is typically less than 50 ft except for isolated hills (Fidlar, 1948, p. 10).

Undulating, rolling plains with a thin cover of till, loess, and silt characterize the area east of the Wabash terraces. Local relief is greater in the uplands of southern Posey County beyond the maximum extent of glaciation (fig. 49). Broad, flat lake plains that form present day bottomlands east of the terraces were created during Wisconsinan time when tributary valleys became ponded by the rapid aggradation of the valley floor (Fidlar, 1948, p. 102). In the surrounding uplands, bedrock terraces were eroded on resistant limestones and shales.

Steep bluffs rise from the Wabash Valley flood plain near the towns of Merom, Vincennes, and New Harmony, where the flood plain narrows. Relief is 100 to 150 ft in these areas. Springs are common along the bluffs. Isolated rock islands are exposed in the Wabash River flood plain. These erosional remnants, or braided-valley cores, are loess-covered bedrock that has withstood erosion. These hills rise nearly 100 ft above the flood plain (Fidlar, 1948; Thornbury, 1950).

Surface-Water Hydrology

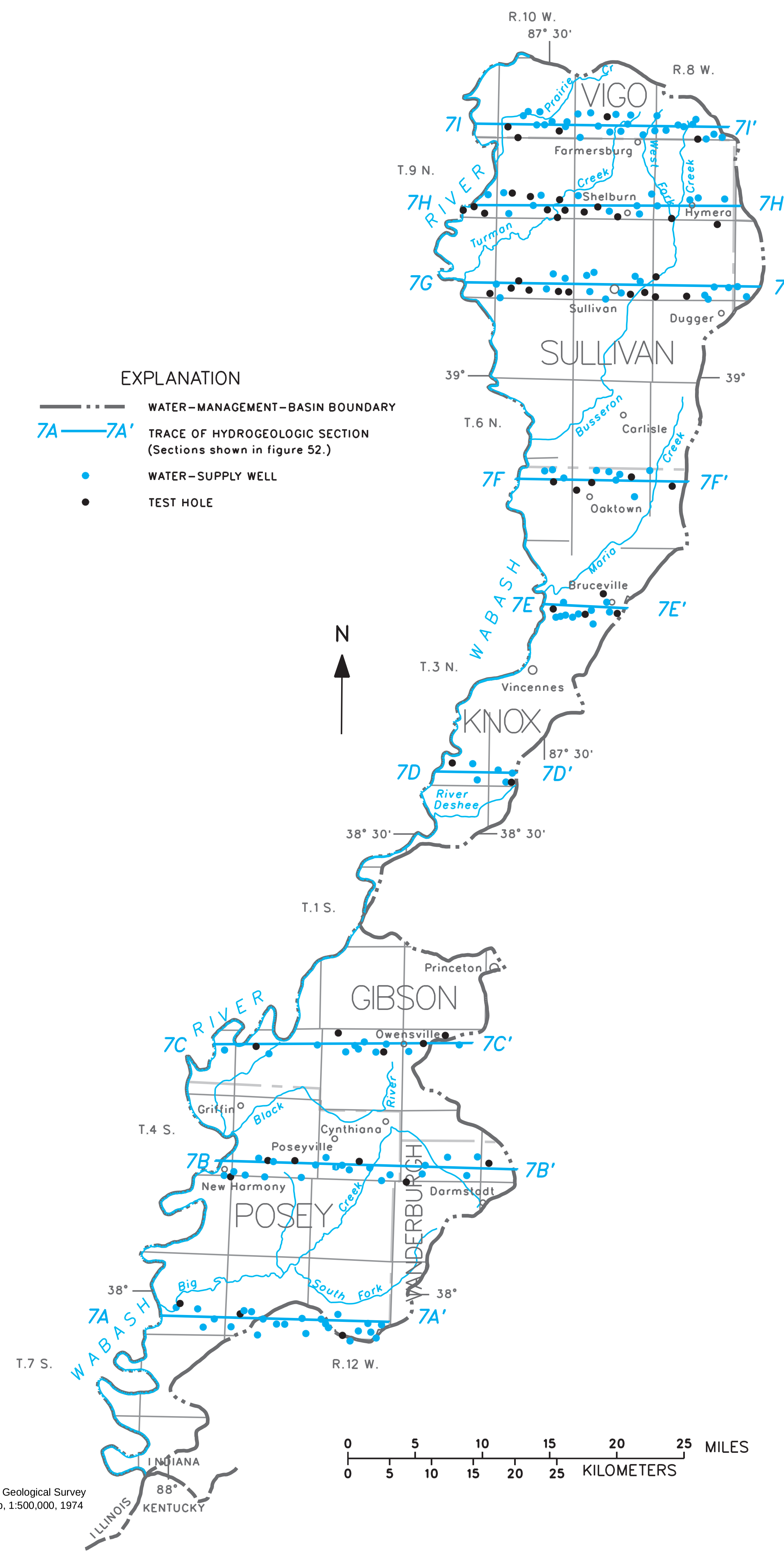
The Wabash River has been divided into three separate water-management basins encompassing the upper, middle, and lower reaches (fig. 1). The Wabash River drains an area of 32,910 mi^2, including parts of Illinois and Ohio (Hoggatt, 1975, p. 174). The Lower Wabash River basin includes about 10 percent of the drainage area of the Wabash River basin in Indiana (Hoggatt, 1975). A streamflow gaging station on the Wabash River, located below the mouth of the Patoka River at drainage area 28,635 mi^2, has been in operation since 1927. During the period of record, discharges at this station ranged from a daily mean discharge of 1,650 ft^3/s to an instantaneous maximum of 305,000 ft^3/s, with an average flow of 27,569 ft^3/s (Glatfelter and others, 1989, p. 183). The average gradient of the Wabash River in the Lower Wabash River basin is approximately 0.7 ft/mi (Fidlar, 1948, p. 7).

The major tributaries to the Wabash River in the Lower Wabash River basin with drainage areas greater than 50 mi^2 include Prairie Creek, Turman Creek, Busseron Creek, Maria Creek, River Deshee, Black River, and Big Creek (fig. 48). The White River and the Patoka River also drain into the Wabash River in the Lower Wabash River basin; however, these two rivers are in separate water-management basins and are discussed in other sections of this report. The Patoka River and the White River are major tributaries that contribute more than 40 percent of the average flow in the Wabash River.

Geology

Bedrock Deposits

Pennsylvanian rocks are at the bedrock surface throughout the Lower Wabash River basin (fig. 50) and are more than 1,000 ft thick. A lithologic sequence of sandstone, shaly sandstone, shale, thin limestone, coal, and underclay comprise the Raccoon Creek, Carbondale, and McLeansboro Groups of



Base from U.S. Geological Survey
State Base Map, 1:500,000, 1974

Figure 48. Location of section lines and wells plotted in the Lower Wabash River basin.

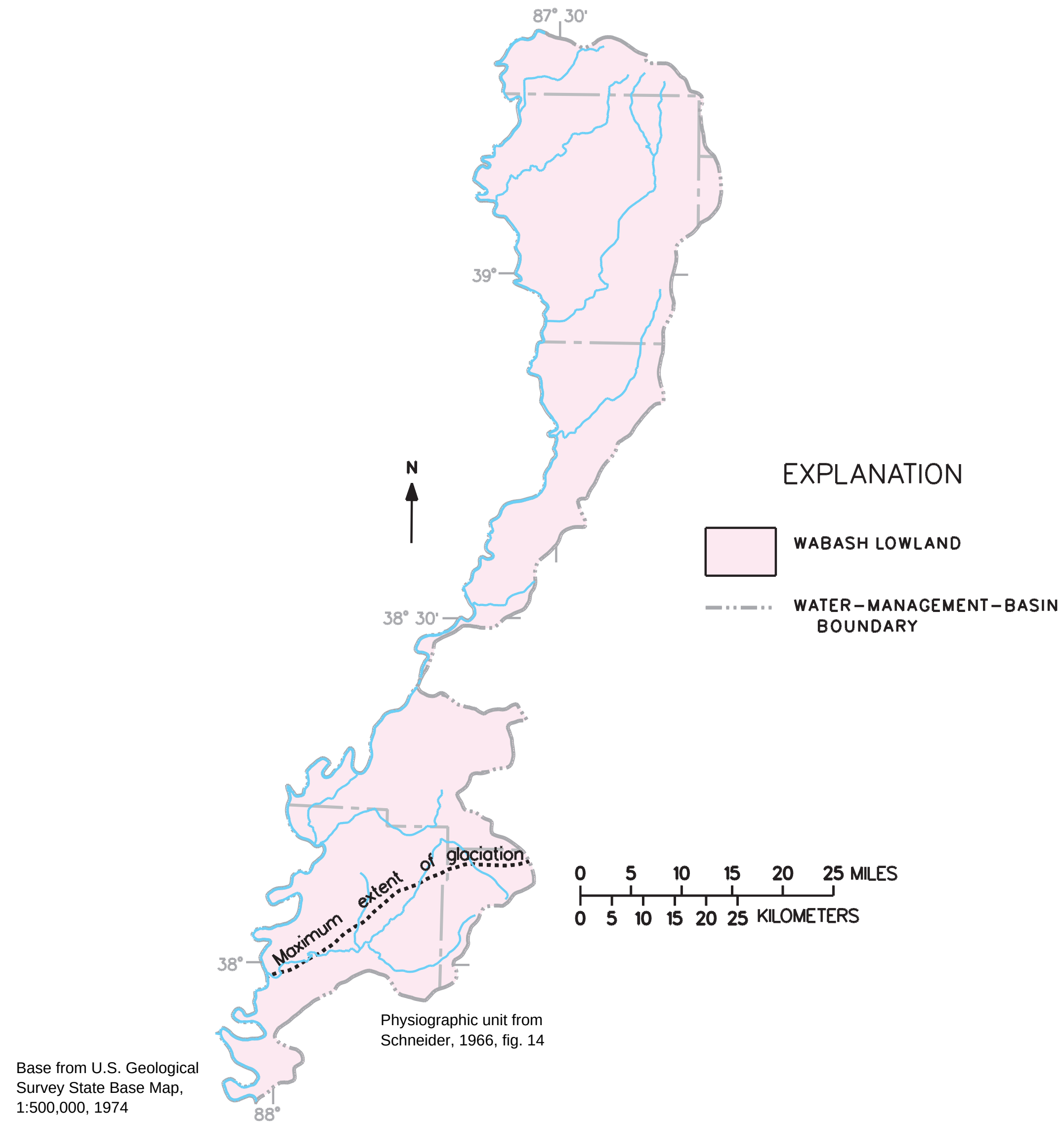


Figure 49. Physiographic unit and extent of glaciation in the Lower Wabash River basin.

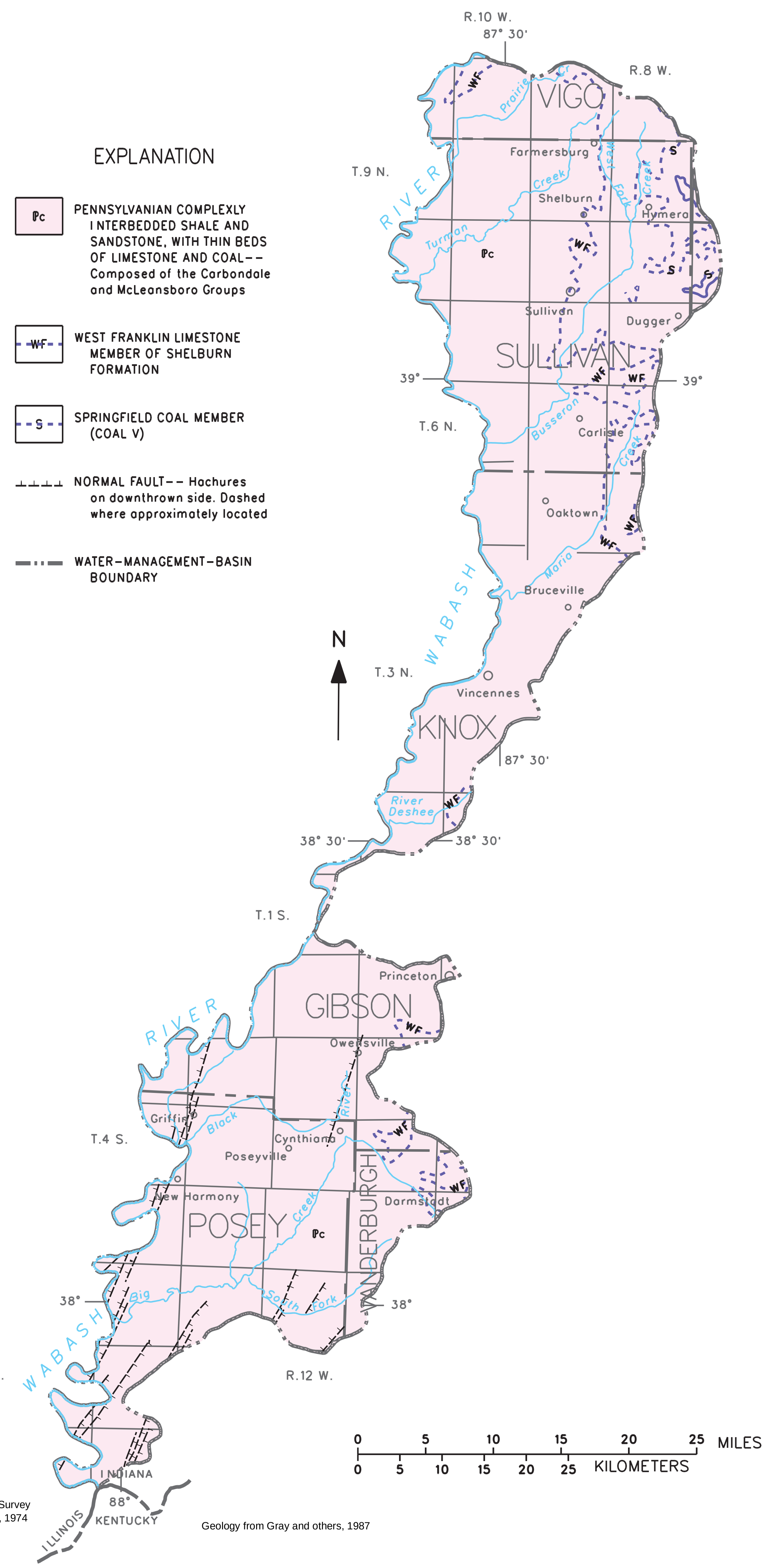
Pennsylvanian age (fig. 5; Cable and others, 1971). Stratigraphic units are extremely difficult to trace in the subsurface because distinct lithologies of the clastic rock types are few, and lateral facies changes can be abrupt. Moreover, certain beds are discontinuous or absent locally, sharp variations in thickness occur over relatively short distances, and beds may have been eroded or never deposited. Formations of Pennsylvanian age are typically referenced with respect to the thin beds of the major coal seams and limestones that are the only consistent, areally extensive layers in the lithologic sequence (Harrell, 1935; Gray, 1979, p. 13).

Pennsylvanian bedrock exposed at the land surface or bedrock surface in the basin belong to the Linton, Petersburg, and Dugger Formations of the Carbondale Group and to the Shelburn, Patoka, Bond, and Mattoon Formations of the McLeansboro Group. These rocks overlie the Mansfield, Brazil, and Staunton Formations of the Early Pennsylvanian Raccoon Creek Group (fig. 5). These Pennsylvanian rocks unconformably overlie older Mississippian rocks (Shaver and others, 1986).

The Raccoon Creek Group ranges in thickness from 100 to 1,000 ft and is composed of 95 percent shale and sandstone, plus minor amounts of clay, coal, and limestone. Shale is more common than the massive, fine-grained, crossbedded sandstones. The Mansfield Formation is 50 to 300 ft thick and is divided into two general lithologies: a lower sandstone, and an upper division of mostly shale and mudstone. In the Lower Wabash River basin, the Mansfield Formation is typically overlain by more than 500 ft of rock. The Brazil Formation ranges in thickness from 40 to 90 ft and includes the Lower Block and Upper Block Coal Members (fig. 5). The Staunton Formation is 75 to 150 ft of sandstone, shale, and as many as eight coal beds, including the Seelyville Coal Member (Coal III). The Seelyville Coal averages 6 ft in thickness in the northern coal fields and has a 4- to 6-ft-thick plastic underclay with some shale (Shaver and others, 1986; Murray, 1957, p. 26).

The Carbondale Group ranges in thickness from 260 to 470 ft and averages 300 ft. The group, which is thickest in central Posey County, is composed primarily of variable shales and sandstones and includes some laterally extensive limestone and coal beds. The Linton Formation ranges in thickness from 43 to 162 ft and averages 80 ft. Lateral lithologic variations are common. The Petersburg Formation is 70 to 190 ft thick and includes the Springfield Coal Member (Coal V) (fig. 50). The Springfield Coal Member attains a maximum thickness of 13 ft and is split in places by as much as 65 ft of shale. This coal seam underlies as much as 90 ft of gray, silty shale in the Lower Wabash River basin. The clay layer beneath the Springfield Coal Member averages 2 to 5 ft in thickness. The Dugger Formation ranges in thickness from 73 to 185 ft, and includes the Danville Coal Member (Coal VII) and the Anvil Rock Sandstone Member. The Danville Coal seam attains thicknesses of 6.5 ft in Vigo County, then thins to 0.2 ft toward the south. The underclay associated with the Danville Coal Member averages 4 to 6 ft in thickness (Shaver and others, 1986; Murray, 1957, p. 26).

The McLeansboro Group attains its maximum thickness of 770 ft in northern Posey County. The group is made up of 90 percent shale and sandstone plus minor amounts of siltstone, limestone, clay, and coal. The Shelburn Formation ranges in thickness from 50 to 250 ft and is composed primarily of shale, siltstone, and sandstone. This formation crops out in the Lower Wabash River basin from the Ohio River in Vanderburgh and Posey Counties north through Vigo County. Included in the Shelburn Formation are the Busseron Sandstone Member and the West Franklin Limestone Member (fig. 50). The Busseron Sandstone Member rests unconformably on the Danville Coal Member. This sandstone is gray to tan, fine to medium grained, massive, and interbedded in places with a gray shale. Thickness ranges from 48 to 77 ft in Sullivan County; the member appears to be absent in many places within Posey County. The West Franklin Limestone Member consists of one to three limestone beds as much as 10 ft thick separated by as much as 25 ft of shale.



Base from U.S. Geological Survey State Base Map, 1:500,000, 1974

Geology from Gray and others, 1987

Figure 50. Bedrock geology of the Lower Wabash River basin.

One or more of the beds may not be present in parts of Posey and Gibson Counties (Shaver and others, 1986).

The Bond and Mattoon Formations are present only in the far western part of the Lower Wabash River basin (fig. 50). The formations are primarily shale, siltstone, and sandstone. The Bond Formation attains thicknesses of 250 ft in northwestern Posey County. Only the upper 40 ft of the Mattoon Formation is present in Western Sullivan County, whereas the lower 150 ft, including the Merom Sandstone Member is present in northwestern Posey County (Shaver and others, 1986).

A pronounced structural feature of the region is the Illinois Basin (fig. 4). The major stratigraphic units in the Lower Wabash River basin become thinner with distance from the center of the basin, which is in southeastern Illinois. In the Lower Wabash River basin, the Pennsylvanian rocks generally dip to the west-southwest at approximately 25 ft/mi (Gray, 1979, p. 3). In contrast to the topography of the formations that are exposed at the land surface, the bedrock surface beneath the glacial drift is generally a gently rolling plain. Valleys of the unglaciated areas are filled with valley-train deposits or lake sediments (Cable and Robison, 1973; Cable and Wolf, 1977, p. 6).

Faults in the Wabash Valley are another pronounced structural feature of the basin (fig. 50). Faults as much as 30 mi long, with displacements greater than 400 ft, have been identified (Ault and Sullivan, 1982). These post-Pennsylvanian faults are present as single planes and in zones of multiple planes. The faults in the Lower Wabash River basin are confined to Posey and Gibson Counties and trend north-northeastward, parallel to faults in Kentucky and Illinois (Ault and Sullivan, 1982, p. 7). Eleven distinct faults or fault systems, with displacement between 20 and 450 ft, have been mapped and named by Ault and Sullivan (1982, p. 12). Faults in the Inglefield Sandstone Member of Posey County have been mapped by Robison (1977, pl. 3) (see section 7A–7A′, fig. 52). Faulting in the Springfield Coal Member has been mapped in northern Posey County by Tanner and others (1981b).

Unconsolidated Deposits

In the aggraded valleys of the Wabash River and major tributaries, the primary unconsolidated deposits consist of alluvium that overlies thick Pleistocene valley-train sand and gravel deposits. The thickness of unconsolidated deposits in the Lower Wabash River basin is shown in figure 51. Thicknesses of sand and gravel as great as 150 ft have been measured adjacent to the Wabash River (Fidlar, 1948, pl. 3) and along Busseron Creek. In general, the sand and gravel deposits lie directly on the bedrock (Shedlock, 1980). Thickness of unconsolidated deposits decreases to 50 ft in minor tributary valleys and to less than 50 ft in the uplands (Gray, 1983). Many oxbow lakes and abandoned meanders are present in the modern Wabash River flood plain. Some of these depressions are filled with gravel and silt carried by floodwaters. Pre-Wisconsinan glacial drift of variable thickness covers the Pennsylvanian bedrock in the upland areas. Loess and sand dunes as much as 50 ft thick are scattered throughout the basin and cover the drift locally. Sand dunes have developed on terraces and lake plains along the edge of the Wabash River valley and on some nearby uplands. The dunes are primarily in Sullivan and Vigo Counties (Fidlar, 1948, p. 91-95).

Clay and silt beds were deposited in the lake plains along many of the tributary valleys. During Wisconsinan time, lakes once covered much of central and north-central Posey County and areas of Sullivan, Gibson, and Vanderburgh Counties (Fidlar, 1948, pl. 1). Lake-silt deposits up to 150 ft have been measured in northern Gibson County. Many of the lake plains have been buried beneath younger wind-blown sediments (Fidlar, 1948, p. 48).

Aquifer Types

Nine hydrogeologic sections (7A–7A′ to 7I–7I′) were produced for this atlas to depict aquifer types in the Lower Wabash River basin (fig. 52). All sections are oriented west to east, approximately perpendicular to the Wabash River (fig. 48). Section lines were drawn at about 12-mi intervals, except in northern Sullivan County where section lines were drawn at 6-mi intervals and in northern Gibson County where there is a 20-mi interval between two section lines. The average density of logged wells plotted along the section lines is 1.3 wells per mile.

The major aquifer type in the Lower Wabash River basin is the outwash and alluvial sand and gravel in the Wabash River valley. These thick sand and gravel deposits are relatively clean, well sorted, and coarse grained. A secondary unconsolidated source of ground water in the basin is the buried sand and gravel in tributary valleys. These deposits are covered by more than 10 ft of silt and clay. Additional unconsolidated ground-water resources include sand and gravel lenses interbedded with lake sediments and glacial till, and dune sands (Cable and others, 1971; Cable and Robison, 1973; Robison, 1977; Clark, 1980).

Wells drilled into the Pennsylvanian bedrock are commonly finished in the intervals that contain sandstones at the base of individual formations. Although these sandstones typically are the major sources of ground water in the bedrock, wells commonly are open to layers of shale, limestone, sandstone, and coal. The presence of laterally thin and discontinuous deposits results in extremely complex lithology and difficult aquifer definition in the basin. Therefore, it is impossible to delineate the exact source of the water to most wells. Yields of ground water from the bedrock are rarely enough for any use other than domestic. Thus, the importance of these bedrock aquifers lies not in their productivity but in their wide areal distribution. They are commonly the sole source of freshwater in the interior of the Lower Wabash River basin.

The four aquifer types of the Lower Wabash River basin are summarized in table 9. The table includes range of thickness, range of reported yields, and common or geologic names that previous authors have used to define the aquifers.

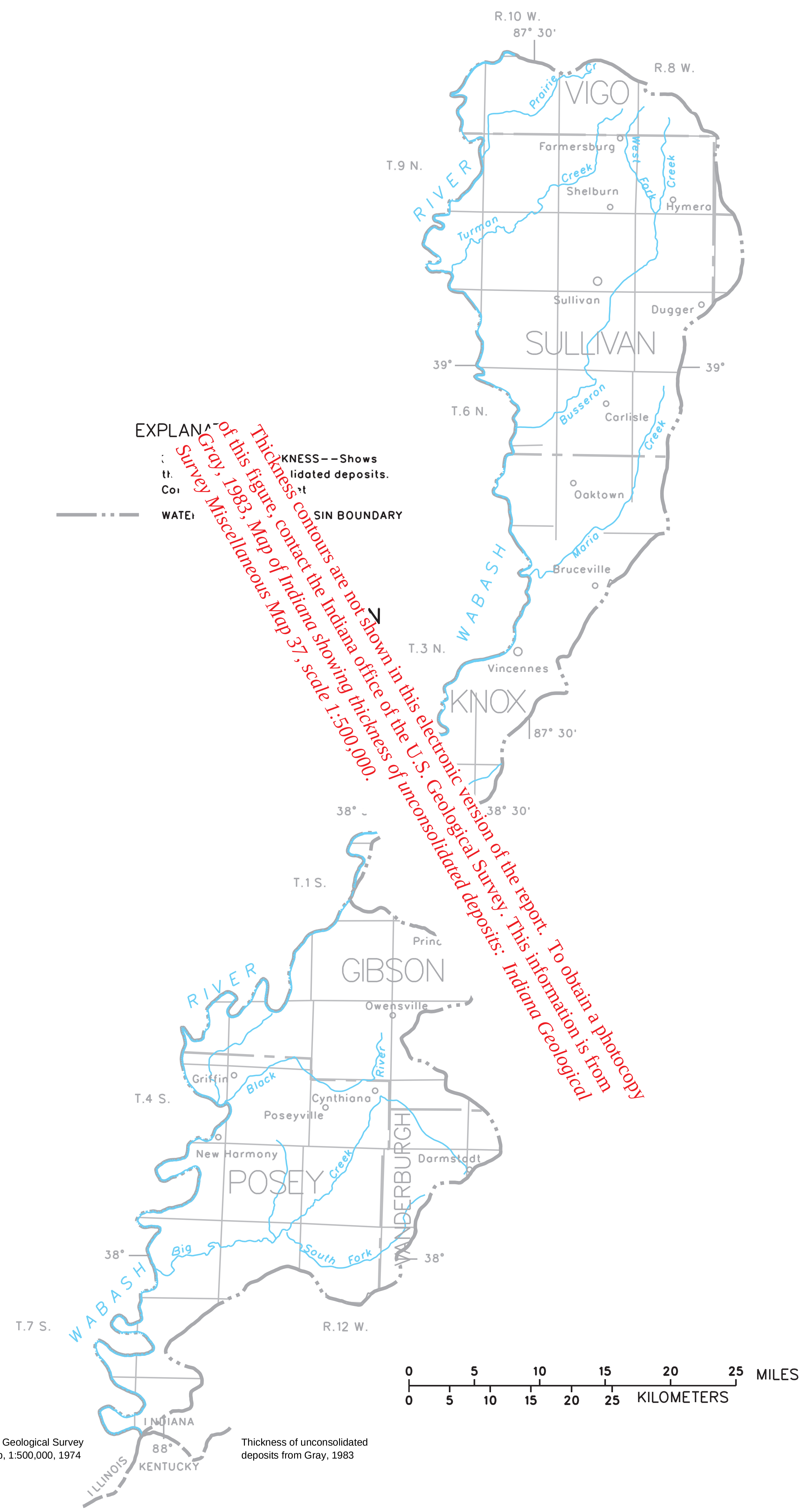
Unconsolidated Aquifers

A surficial sand and gravel aquifer is present along the Wabash River flood plain in the northern two-thirds of the basin (fig. 53). Although the surficial sand and gravel is depicted on the northern seven hydrogeologic sections, this aquifer is shown most extensively in sections 7D–7D′ and 7F–7F′ (fig. 52). Yields from wells located outside the Wabash River valley are typically much less than yields from the Wabash valley (table 9).

Sand dunes were mapped as surficial aquifer only where they are known to be producing water, such as in section 7F–7F′, R. 9 W. (fig. 52). Dune sands typically are thin deposits with a highly fluctuating water table; thus, dune sands are relatively undependable as a source of water. Instead of being used as aquifers, the dune sands in the Lower Wabash River basin commonly function as recharge areas for underlying aquifer material (Gray, 1973).

Buried sand and gravel aquifers generally are present in the southern one-third of the Wabash River flood plain and in the valleys of the major tributaries to the Wabash River. The buried sand and gravel in the Wabash River valley (sections 7A–7A′ to 7C–7C′, fig. 52) is connected to and of the same origin as the surficial sand and gravel aquifer to the north. The gradational boundary between the surficial and buried sand and gravel aquifers in the Wabash River valley is the area where the outwash is buried by more than 10 ft of nonaquifer alluvial material. In general, the aquifer is buried by about 10 to 20 ft of alluvial sand, silt and clay material. Buried sand and gravel aquifers also are present along Busseron, Prairie, Turman, Maria, and Big Creeks (fig. 53). The Busseron Creek and Turman Creek sand and gravel deposits are shown in section 7H–7H′ (fig. 52). Another buried sand and gravel aquifer underlies low-permeability clay and silt in the uplands near Poseyville (Robison, 1977, pl. 1,2).

Recharge to the unconsolidated aquifers typically occurs where precipitation infiltrates directly into the aquifer or through the overlying glacial or fine-grained alluvial material. Shedlock (1980) estimated recharge rates to the outwash aquifer near Vincennes to be 12 in/yr.



Base from U.S. Geological Survey
State Base Map, 1:500,000, 1974

Thickness of unconsolidated
deposits from Gray, 1983

Figure 51. Thickness of unconsolidated deposits in the Lower Wabash River basin.

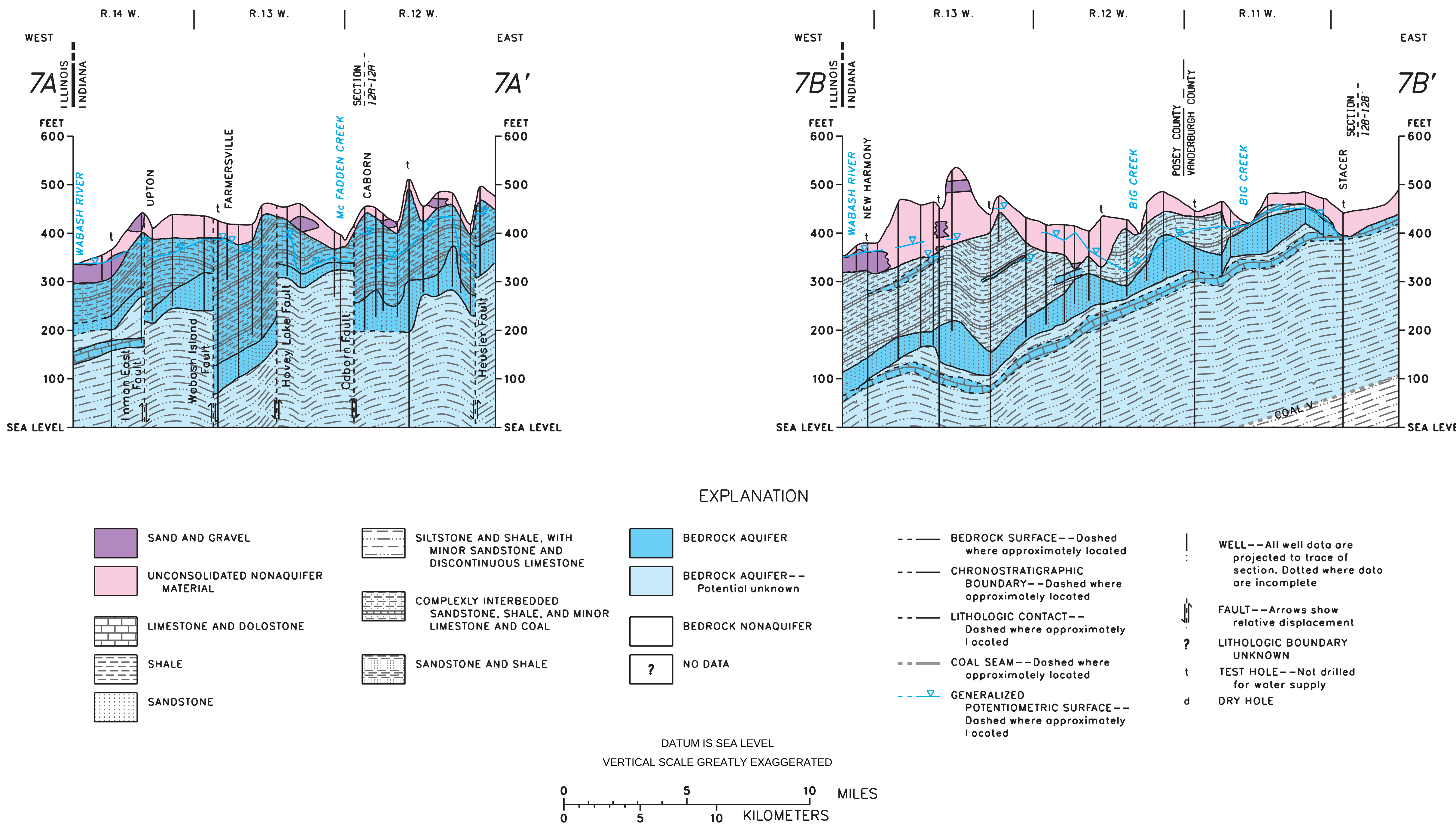


Figure 52. Hydrogeologic sections *7A*–*7A′* to *7I*–*7I′* of the Lower Wabash River basin.

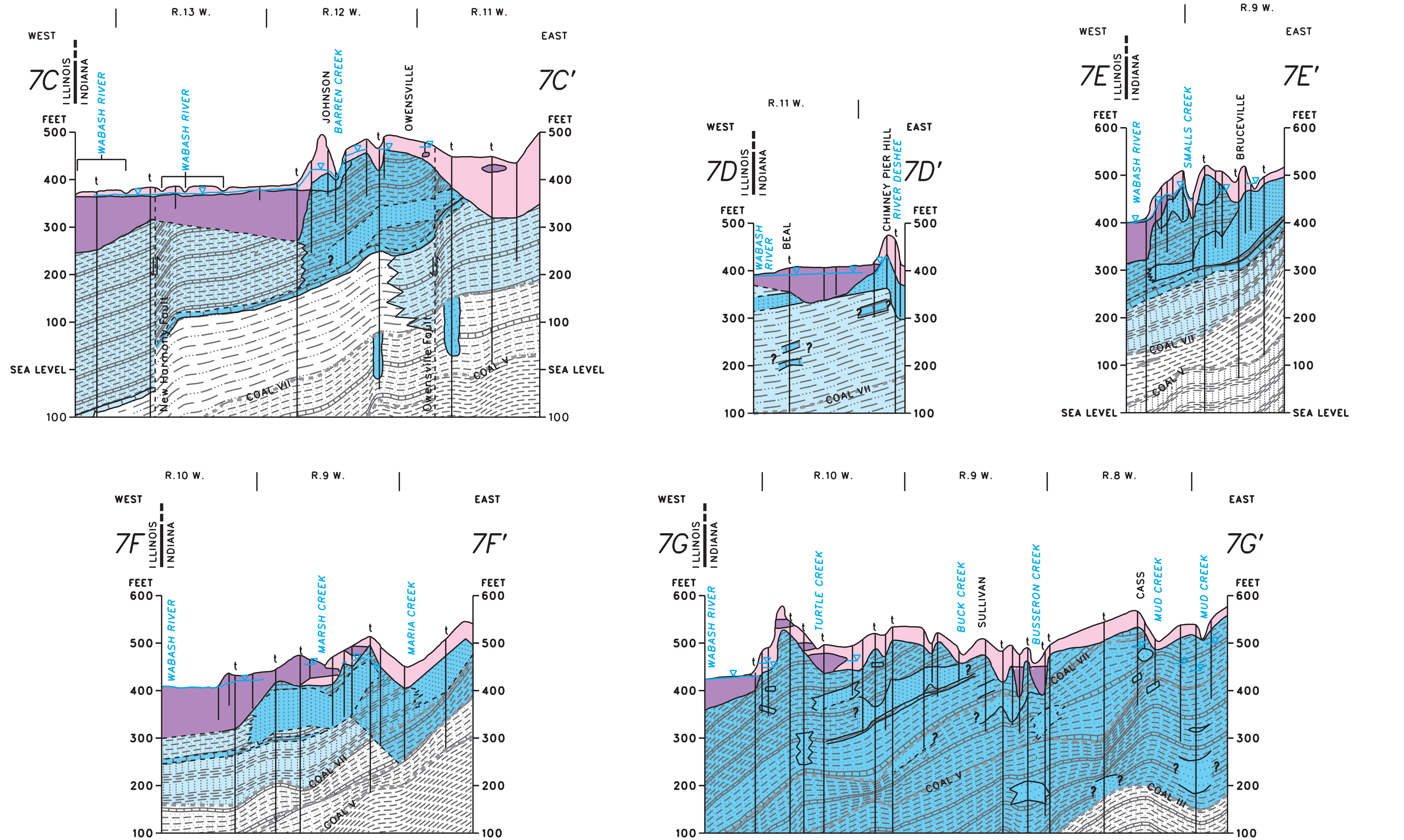
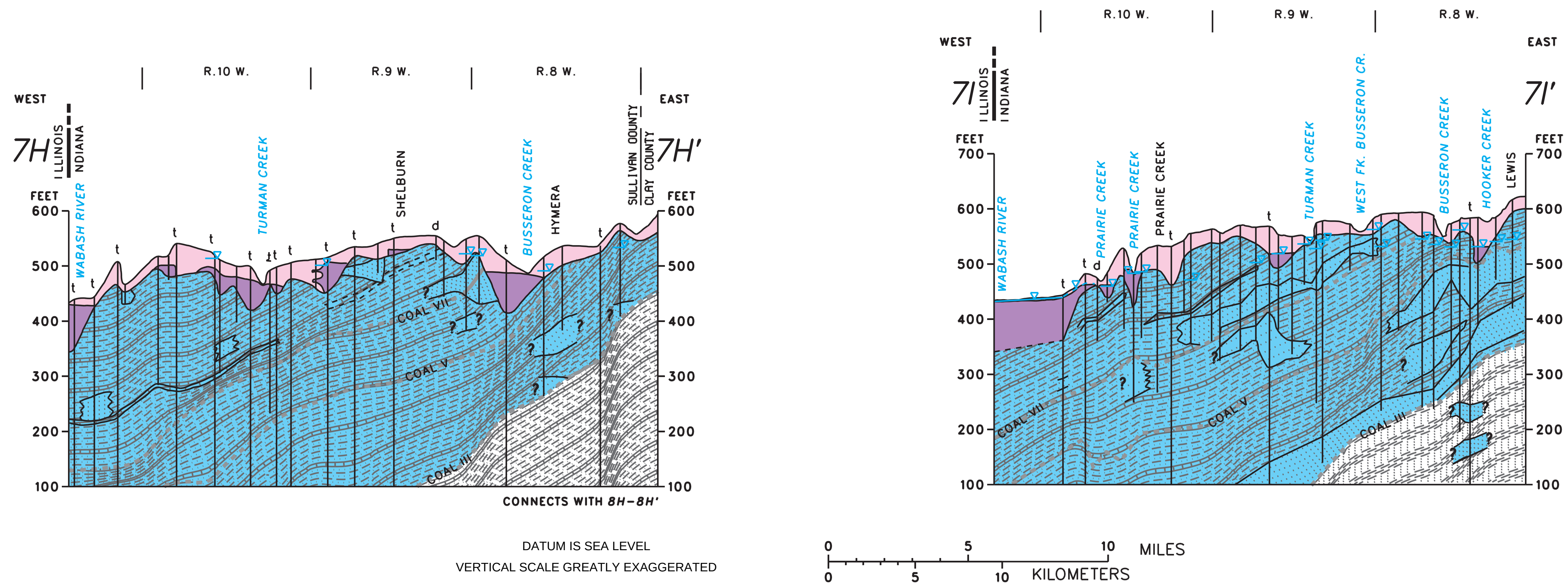


Figure 52. Hydrogeologic sections *7A–7A′* to *7I–7I′* of the Lower Wabash River basin.



Recharge from adjacent uplands and underlying bedrock is approximately 3 in/yr or 25 percent of the total recharge. Ground water in the unconsolidated aquifers naturally flows toward the Wabash River or its tributaries, where it discharges (Cable and others, 1971; Robison, 1977).

Bedrock Aquifers

The Inglefield Sandstone Member is the thickest and most laterally extensive bedrock aquifer in Vanderburgh, Posey, and Gibson Counties, as shown in sections 7A–7A′, 7B–7B′, and 7C–7C′ (fig. 52). The continuity of the sandstone aquifer is disrupted in section 7A–7A′ (fig. 52) by the many faults in Posey County. The areal extent of the sandstone shown on the aquifer map (fig. 53) generally follows the distribution of the Inglefield and Busseron Sandstone Members (Wier and Girdley, 1963; Barnhart and Middleman, 1990). The West Franklin Limestone Member typically underlies the Inglefield Sandstone Member and is used as a source of fresh water in places (see section 7B–7B′ in fig. 52). Normally, though, drillers complete wells in the more productive sandstone and do not penetrate the limestone below. The West Franklin Limestone Member is included with the complexly interbedded aquifer shown in figure 53. Other potential aquifers in Vanderburgh County include a sandstone in the Upper Dugger Formation which grades into shale, and the Coxville Sandstone Member, which is too deep and saline for water supply throughout much of the basin (Cable and Wolf, 1977, p. 12-14). The thick, narrow channel sandstones (for example, the Anvil Rock Sandstone Member) typically produce more water than the thin, broader sheet sandstones associated with the complexly interbedded aquifer (Cable and others, 1971). Two channel sandstones are depicted in section 7C–7C′ in R. 12 W. and R. 11 W. (fig. 52). Other less significant sandstones have been mapped on most of the sections. A few are laterally continuous, whereas many sandstones abruptly grade into shales, as shown in section 7I–7I′ (fig. 52).

Aquifers associated with complexly interbedded sandstone, shale, limestone, and coal are mapped together where most wells are open to the entire bedrock section below the unconsolidated material. Generally, the sandstones and coals are the primary water-producing units. Coal seams can be locally significant water-producing zones only if an underclay is present beneath the coal and the coal is fractured (Harrell, 1935, p. 76; Banaszak, 1980; Smith and Krothe, 1983). The underclays are important hydrologically as low-permeability, semiconfining beds capable of perching ground water in the coal seams and associated strata above. The approximate location of three major coal seams has been shown on the hydrogeologic sections. These coal seams are most likely to function as aquifers, owing to the presence of thick underclays. The complexly interbedded aquifer type is present throughout the entire basin (fig. 53); however, along the Wabash River valley in Gibson County, it is buried too deeply to be of use. The complexly interbedded aquifer material is best shown in the northern sections (7G–7G′, 7H–7H′, and 7I–7I′ in fig. 52).

Table 9. Characteristics of aquifer types in the Lower Wabash River basin
[Locations of aquifer types shown in fig. 53]

Aquifer type	Thickness (feet)	Range of yield (gallons per minute)	Common name(s)
Surficial sand and ravel	10-150	[1]50- 2,700	Wabash Valley outwash, valley train, and dune sand
Buried sand and gravel	10- 50	[2,3]5- 300	Interbedded sand and gravel lenses
Sandstone	20- 65	[4]0.5- 20	Inglefield Sandstone Member[2,3] or Patoka aquifer[4] or white water sand
Complexly interbedded sandstone, shale, limestone, and coal	[3,5]20- 50	[6]0.1- 15	Busseron Sandstone Member[1,3,5,6] or Unit 6[1]
	[5]1- 63	[6]8- 56	Coxville [4,6] or Linton aquifer[4]
			Anvil Rock [7], Merom[2], and St. Wendel[2] Sandstone Members
	0- 10	[1,3]0.5- 20	Danville (Coal VII), Springfield (Coal V), and Seelyville (Coal III) Members
			West Franklin Limestone Member[2] ; Units 2 and 3[8]

[1]Cable and others, 1971.
[2]Robison, 1977.
[3]Barnhart and Middleman, 1990.
[4]Cable and Wolf, 1977.
[5]Glore, 1970.
[6]Wier and others, 1973.
[7]Hopkins, 1958.
[8]Cable and Robison, 1973.

It is commonly impossible to laterally correlate a sandstone unit across a section or to know whether a specific sandstone or other stratigraphic unit is saturated or water-producing unless noted by the well drillers. Therefore, bedrock not indicated as “aquifer material” on the hydrogeologic sections implies that an abundance of low-permeability shale or sandy shale is present. If no information was available to indicate whether the rocks are aquifer or nonaquifer material, then the area is shown as “aquifer—potential unknown” on the section. An example is the material depicted beneath the sandstone aquifer in section 7A–7A′ (fig. 52). All of the complexly interbedded sandstone, shale, limestone, and coal was mapped as “aquifer—potential unknown” on figure 53 because of the difficulty in mapping aquifer zones in the complexly interbedded bedrock where hydrogeologic properties can abruptly change.

The cementation of the sandstones limits their hydraulic conductivity; the confining nature of the overlying shales and the underclays limits the recharge to the sandstones. These two factors contribute to the low yield from most sandstone aquifers in the basin (Glore, 1970, p. 34-35; Wier and others, 1973, p. 301). On the other hand, the sandstones of the Mansfield Formation at the Mississippian-Pennsylvanian contact (fig. 5) are reported to be a source of water, but they are too deep to be an economically desirable source of freshwater in the Lower Wabash River basin (Harrell, 1935; Watkins and Jordan, 1963; Cable and others, 1971; Cable and Robison, 1973; Robison, 1977; Banaszak, 1980; Clark, 1980; Smith and Krothe, 1983; Barnhart and Middleman, 1990).

The approximate locations of the Danville (Coal VII), Springfield (Coal V), and Seelyville (Coal III) Coal Members have been shown on the hydrogeologic sections (fig. 52) on the basis of data from the drilling records and previous studies (Wier, 1952a, 1952b; Friedman, 1954; Waddell, 1954; Wier and Powell, 1967; Tanner and others, 1981a, 1981b, 1981c). The coals are closer to the surface and are more commonly used as sources of water in the northern sections (7G–7G′, 7H–7H′, and 7I–7I′ in fig. 52), where sandstones are absent or discontinuous, than in other parts of the basin. Smith and Krothe (1983) found that many of the coal seams have higher transmissivities and specific capacities than the sandstones.

Recharge to bedrock aquifers occurs primarily near outcrop areas or indirectly through thin overlying unconsolidated deposits at a rate of a few inches per year (R.J. Shedlock, U.S. Geological Survey, written comm., 1982). The outcrop of the Inglefield Sandstone Member near the eastern boundary of the Lower Wabash River basin in Vanderburgh and Gibson Counties (Cable and Wolf, 1977, p. 16; Barnhart and Middleman, 1990, p. 6) could be a conduit for recharge to some of the coal seams (Banaszak, 1980). Ground water discharges from the Pennsylvanian sandstones near Vincennes by upward flow into the glacial outwash; ground water in the outwash discharges to the Wabash River and its tributaries (Shedlock, 1980).

Summary

The Lower Wabash River basin encompasses 1,339 mi^2 of Sullivan, Posey, Vigo, Greene, Knox, Gibson, and Vanderburgh Counties in southwestern Indiana. The basin includes all west-flowing drainage into the Wabash River from Honey Creek in Vigo County to the mouth of the Wabash River at the Ohio River in Posey County, nearly 304 river miles.

Four aquifer types were delineated in the Lower Wabash River basin. The principal aquifer in the basin is the thick sand and gravel deposits in the Wabash River valley. Yields of as much as 2,700 gal/min have been obtained from this aquifer, which is 150 ft thick in places. The aquifer boundary generally follows the flood plain along the river and was mapped as surficial sand and gravel in the northern part of the basin and buried sand and gravel in the southern part of the basin. Less productive surficial aquifers are present in the valleys of Busseron and Big Creeks, the major tributaries to the Wabash River within the basin.

Secondary aquifers are present in the buried sand and gravel deposits along minor tributary valleys and within upland lake deposits. In the uplands beyond the Wabash valley, sandstone aquifers provide water for domestic purposes where sand and gravel sources are absent. Thick sandstone aquifers are common in Posey and Gibson Counties, but the presence of faults in this area makes determination of the exact depth of the aquifer difficult. In many other areas within the interior of the basin, aquifers are limited to the complexly interbedded layers of sandstone, shale, limestone, and coal. Production is slight and generally limited to areas of fractures and joints, primarily in the sandstone and coal.

Discharge from surficial and buried sand and gravel aquifers in the basin is typically toward the Wabash River and its tributaries. Regional discharge from the bedrock aquifers appears to be upward to the Wabash River.

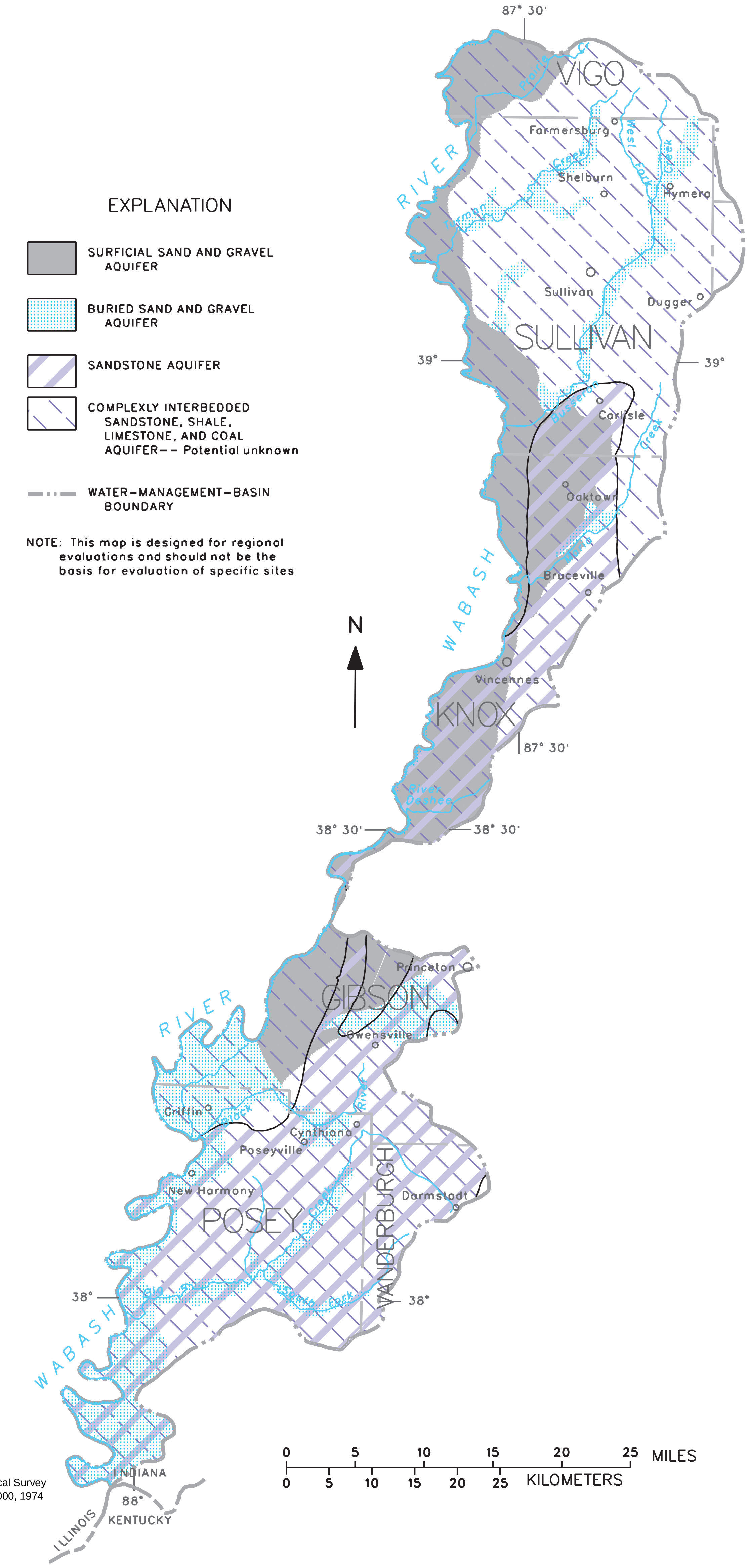


Figure 53. Extent of aquifer types in the Lower Wabash River basin.

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