

HISTORICAL AND GEOMORPHIC CONCEPTS OF THE LAFAYETTE BEDROCK VALLEY SYSTEM (SO-CALLED TEAYS VALLEY) IN INDIANA

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By N. K. BLEUER

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HISTORICAL AND GEOMORPHIC CONCEPTS OF THE LAFAYETTE BEDROCK VALLEY SYSTEM (SO-CALLED TEAYS VALLEY) IN INDIANA

By N. K. Bleuer

ABSTRACT

The Lafayette Bedrock Valley System (new name) is a physically defined system of deep bedrock valleys that merge in the vicinity of Lafayette, Ind. The primary trunk valley of that system, the Teays Valley of traditional terminology, is composed of an eastern part, the Marion Valley Section (new name), and a western part, the Mahomet Valley Section (modified name). The Lafayette system includes shallow, high-level inset valleys, such as those presently trapped atop rock sills along the modern Maumee-Wabash Trough.

This valley system probably never existed in its present form at any point in time. The stratigraphy of the valley fill indicates that parts of the system were filled at different times, and therefore they may have been connected as drainage routes in a variety of configurations at different times. The conceptually defined drainage systems that followed such routes include a system that followed the Marion and Mahomet Valley Sections (assumed to be the classic Teays drainage) and other systems that may have followed the Metea and Mahomet Valley Sections (modified names) or any of several other possible bedrock-valley routes.

INTRODUCTION

At least four deep bedrock valleys converge on the bedrock lowland between Lafayette and Delphi, west-central Indiana, and two deep bedrock valleys and two shallow bedrock valleys (the valley of the present Wabash River is one of the latter) diverge toward the west, southeast, and south from Lafayette (Gray, 1983; Bruns and others, 1985) (pl. 1). If these valleys were exposed at the surface, undoubtedly they would have long since been subjected to intense classic geomorphologic scrutiny, which would have resulted in any number of complicated hypotheses of post-Tertiary drainage development that might involve control by lithology and structure as well as

rearrangement or superposition owing to episodes of glaciation.

They are not so exposed, however, and in the history of their recognition the common theme has been the concept of a single continuous valley—first as a resumed precursor of the modern Wabash River, and finally as the variously named Teays-Mahomet trunk valley of more recent literature, although variations in the latter theme, based on very simplistic glaciation models, have been recognized. No theme suggests the complexity that might be inferred just as logically from bedrock morphology alone; none incorporates knowledge of the stratigraphy and age of materials filling the valleys.

The stratigraphy of the fill of the traditional Teays Valley in Indiana, the combined Marion and Mahomet Valley Sections (defined below), is now fairly well known (Bleuer, 1980, 1983, in preparation), and enough is known of the fill of other related valleys to allow preliminary stratigraphic comparisons to be made. The stratigraphy, combined with the obvious complexity of morphology, suggests that our reasoning must be freed from a priori assumptions regarding the nature of what has been called a “preglacial” drainage network and of any particular sequence of events or of depths of drainage. Various parts of the valley system must, therefore, be studied as entities, and to do this we must be able to refer to them without the interpretative stigma of the traditional Teays-Mahomet nomenclature, as recommended by Gray (in preparation).

The system of nomenclature adopted here is a hierarchy that includes (1) simple morphologic-geographic definition of individual bedrock-valley systems, sections, and segments; (2) stratigraphic definition of valley-fill materials of those divisions, including the interpretation of internal facies relationships, and relative ages and events of valley-filling history; and (3) morphologic-stratigraphic interpretation and definition of drainage systems through time.

ACKNOWLEDGMENTS

Most present knowledge of the form and stratigraphy of the so-called Teays Valley in Indiana derives from a cooperative study by the Division of Water and the Division of Geological Survey (Indiana Geological Survey), Department of Natural Resources, that culminated in a contractual Teays drilling program during 1977-78. The acquisition of much new seismic information by Joseph F. Whaley (Indiana Geological Survey) and the interchange with William J. Steen and Thomas M. Bruns (Division of Water) throughout that program contributed to the present report.

Several thoughts presented here were developed following presentations at a symposium on the Teays Valley at the 1983 meeting of the Geological Society of America and, particularly, following discussions with Henry H. Gray (Indiana Geological Survey). Most of this report, while fulfilling an obvious nomenclatural need of ensuing discussions, would not have been developed in the absence of Gray's early exposition of that need.

PREVIOUS TERMINOLOGY

The buried bedrock valley crossing north-central Indiana has generally borne a single name, the Teays Valley, embodying a concept of a single preglacial river valley for more than 40 years, but not without a circuitous history of modification. M. M. Fidler (1943) was the first to apply the name to the westward continuation (into the modern lower Wabash River

valley) of the buried valley recognized in western Ohio by Karl Ver Steeg (1934, 1936, 1946). Ver Steeg's valley was the buried continuation of the surface Chillicothe River segment of the Teays Valley of Tight (1903), whose course had been traced northward from the type Teays of West Virginia to the glacial boundary in Ohio. Fidler's Teays included what has locally been called the "deep drive" of the Loblolly district¹ in the Trenton oilfield of Jay County, eastern Indiana (Blatchley, 1897).² This valley had been interpreted by Blatchley as a southward-flowing preglacial channel, but later this same valley, the "deep preglacial channel" of Bownocker (1899), was interpreted as having been an eastward-flowing tributary to the Little Miami River (Bownocker, 1900). The central part of the valley near Peru coincided with the "ancient valley of the Wabash" of A. J. Phinney (1890), and that part near Lafayette coincided with part of a "preglacial Wabash" of Frank Leverett (1895), whose headwaters "may prove to have been in the Lake Michigan basin." Finally, Fidler's entire Teays coincided with the "preglacial Wabash" of C. R. Dryer (1920).

But with the recognition of the Mahomet Valley in Illinois and its connection through Indiana with the Teays (Horberg, 1945),³ Fidler's Teays Valley in Indiana ultimately became the "Mahomet-Teays" (Wayne, 1952), the "Kanawha (Teays)" (Thornbury, 1948), the "Teays (Kanawha)" (McGrain, 1950), and once again just the Teays (Wayne, 1956).

As basic complexities of development were deduced, the Ohio concept of the "Deep stage" [sic] (Ver Steeg, 1936) complicated interpretations fur-

¹The bedrock valley itself has come to be referred to colloquially as the Loblolly.

²To Blatchley (1897, p. 65) "this stream was probably the outlet of the melting waters of a great glacier which occupied a region far to the northeast. These waters flowing for centuries over the Niagara limestone gradually wore a channel through its entire thickness in the region now known as the Loblolly. Afterward the glacier itself moved slowly over the region, grooving and planing the surface of the solid rocks, strewing for hundreds of miles in its track beds of clay and sand and gravel, thereby filling up the channels of its ancient outlets and so hiding all knowledge of their course and depth, until man, seeking with steel drill for a hidden resource, discovers the absence of the eroded rock and reasons out the cause thereof.

The Loblolly district simply embraces a portion of the old bed that was deeper than the rest. The drift deposited in it being so much thicker than over the surrounding area of Niagara rock, and having no solid support near the surface, as did the latter, settled to such an extent that its surface was a few feet lower, and over this lower portion the surface waters collected." (The surface morphology of the Loblolly district is now interpreted as representing Wisconsinan disintegration moraine.)

³Horberg suggested that if the Mahomet Valley were to be confirmed as connected with the Teays, it should be called the lower Teays.

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ther. (See discussions in Wayne, 1952, p. 580-583.)⁴ The restricted term "Mahomet" was suggested as the conceptual lower course of the drainage system after initial glacial blockage of its upper reaches (Wayne, 1952, 1956); the deep lower Wabash Bedrock Valley was explained as a deep stage caused by glacial diversion of that Mahomet into the Wabash via Wayne's Danville Valley.

Terms applied to what was to become Indiana's Teays Valley derived from limited data on a number of individual deep-valley segments. (Although data in the form of several thousands of well records have been used by several authors, it is doubtful that more than a small percentage of the wells actually reached bedrock or were more than indirectly related to delineating the Teays.) The terms typically applied not so much to purely morphologically defined valleys as to conceptually defined systems, whose definitions depended on the interpretive necessities of the time: draining any valley out of Indiana via the only route apparent, the Wabash; draining an Ohio Teays into Indiana via the only route apparent, the Loblolly; draining something into the Mahomet via the only route apparent, the Teays; creating a deep stage in the lower Wabash by diversion of the only potential deep source, the deep Teays. Not only were many early deductions based on very little factual data regarding bedrock configuration, but also virtually none of the interpretations were based on stratigraphy.

LAFAYETTE BEDROCK VALLEY SYSTEM

METHOD OF NOMENCLATURE AND DEFINITION

The valley nomenclature adopted here consists of a hierarchy of bedrock-valley systems, sections, and segments (table 1). The Lafayette Bedrock Valley System is defined as that system of bedrock-valley sections in north-central Indiana that merge in the Lafayette area. (This and all succeeding terms are shown in table 1 and on pl. 1.) The traditional Teays Valley is made up of the Marion and Mahomet Valley Sections (new and modified terms), but it is also variously referred to here by the term "Marion-

Mahomet trunk valley" or as just the "trunk valley." Individual sections and segments of the Lafayette system are defined on the basis of geographic, morphologic, and, to some extent, stratigraphic considerations. The boundaries of valleys defined here are somewhat arbitrary, and defining contours change down or across valley where mechanically convenient (pl. 1). They are drawn with the intent of outlining the concept of the valley parts and with the realization that they may exclude important high-level parts of some valleys.

WESTERN VALLEYS

The Mahomet Valley Section in Indiana is that east-west valley west of Lafayette and west of the exits to the Wabash Bedrock Valley Section (defined below) via the Attica Cutoff Section (defined below) and the sill of the present Wabash River valley at Independence. It is contiguous with the type Mahomet Valley in Illinois. (See Horberg, 1945, and references there.)

The Attica Cutoff Section is that narrow bedrock gorge that connects a deep drainage level of the Battle Ground Lowland Section (defined below) with the Wabash Bedrock Valley Section, a so-called deep-stage level (Wayne, 1952, 1956) of the lower Wabash Valley. At the Great Bend of the Wabash (McBeth, 1900) the modern Wabash River flows off the sill at Independence and across buried sediments that fill the Attica Cutoff Section and the Danville Valley and Wabash Bedrock Valley Sections (latter two sections defined below). The best definition of the cutoff is in records of wells near Independence and Attica and just above Covington. Although Gray (1983) continued only the 500-foot bedrock contour through the cutoff, Bruns and others (1985) and Bleuer (unpublished data) suggest the presence of a continuous gorge flanked by the rock terraces of the Maumee-Wabash Trough, the modern Wabash River valley, in the 6 miles below Williamsport. The floor of the rock gorge lies about 100 feet below the level of the floor of the modern valley, that is, below 400 feet in elevation. Previously Wayne (1956, pl. 7) had mapped thick drift (150 feet) beneath the present Wabash River valley, below Williamsport, and had considered it as representing a tributary to the

⁴The so-called deep-stage valleys of southern Ohio are those that are cut below sediments (the Minford Silts) representative of Ver Steeg's "flood stage of the Teays." These sediments fill the exposed Teays Valley south of the glacial boundary. The deep buried valley in Indiana and western Ohio, then, could be correlated with either the Teays itself or with the younger deep-stage valleys.

Table 1. Formally named divisions of the Lafayette Bedrock Valley System

Ranks and surnames			
	System	Section	Segment
Buried bedrock valleys:	Lafayette Bedrock Valley	Mahomet Valley Battle Ground Lowland Logansport Bend Marion Valley Danville Valley Wabash Bedrock Valley Attica Cutoff Frankfort Lowland Linden Valley Wildcat Bedrock Valley Tippecanoe Bedrock Valley Bass Lake Lowland Metea Valley Noblesville Valley Anderson Valley Newcastle Valley Winchester Valley	Peru La Fontaine Geneva Hartford City Bend St. Marys Bend
Exposed bedrock valleys:	Lafayette Bedrock Valley		Sill at Huntington ¹ Klintar at Lagro ¹ Sill at Logansport ¹ Sill at Independence ¹

¹Terminology is for exposed valley parts conceptually similar to buried features designated as segments; the exposed features are high-level rock valleys occupied by the modern Maumee-Wabash Trough.

northwestward-flowing drainage in the Danville Valley of Wayne (1956, figs. 7 and 8). Hutchison (1961) and Burger and others (1966) interpreted low rock elevations in the area as parts of other northwestward-flowing tributaries of the Mahomet. The Attica connection to the Wabash is similar in concept to, but not in the same location as, the connection hypothesized by Fidler (1943) in his early definition of the Teays Valley in Indiana.

The Danville Valley Section, as defined here, is that bedrock valley that enters the Wabash Bedrock Valley Section from the northwest, just below the bend of the modern Wabash River. It is presumed to

be the southern extension of that valley defined by Horberg (1950) at Danville, Ill., although several rock valleys now appear to extend southwestward from Danville toward Indiana (W. H. Johnson, oral communication, 1983). The term is now restricted and does not correspond to the northwestward-trending Danville Valley as so labeled by Wayne (1956, fig. 2), which is not recognized (Gray, 1983).

The Wabash Bedrock Valley Section occupies the Sullivan Lowland of Wayne (1956, p. 42-43), which follows the strike of relatively erodible Pennsylvanian strata. It is that wide, deep valley south of the merge of the Attica Cutoff and Danville Valley Sec-

tions. Wayne proposed the name for the "bedrock valley that controls the course of the Wabash River" beginning "a short distance above Newport," although reference was made to the channel as far north as Warren County. The Wabash Bedrock Valley Section is further defined here as including the major valley west of the present Wabash River at and below Covington where the rock surface lies below 400 feet. (The present Wabash River follows a narrow rock-rimmed course on the inside of the bend downstream from Covington.) Although the course could represent wholly post-Wisconsinan development of the Wabash, the deep 430- to 450-foot rock elevations within it suggest that it may be a reexcavated older channel.

CENTRAL LOWLANDS AND VALLEYS

The Battle Ground Lowland Section is the broad expanse of the trunk valley of the Lafayette system above the juncture of the Mahomet Valley and Attica Cutoff Sections and mostly below the juncture of the Tippecanoe Bedrock Valley and the Marion Valley Section. It is contiguous with, and arbitrarily distinguished from, the Frankfort Lowland Section.

The Frankfort Lowland Section is a broad, but distinct, bedrock low that merges with the Battle Ground lowland on the northwest. The boundary between the two, a line roughly connecting south rims of the Battle Ground lowland, is very arbitrarily suggested. A marked valley constriction into the Anderson and Noblesville Valley Sections marks the eastern boundary. A minor escarpment, the buried equivalent of the Knobstone Escarpment, extends from Lebanon nearly to Independence (see contours in Gray, 1983) and marks the southwestern margin of the lowland. The Frankfort lowland is a broadened equivalent of the lower part of the Anderson Valley of Wayne (1956, fig. 8). The Frankfort and Battle Ground lowlands together are the glacially buried northern part of the Scottsburg Lowland of Wayne (1956, fig. 3), an area corresponding to the outcrop and the subcrop of Devonian shales. They are now excluded from the Scottsburg Lowland of Wayne (1956, fig. 1) because they are separated from the latter by a divide at Noblesville.

The Wildcat Bedrock Valley Section, which merges with the Battle Ground Lowland Section from the east, is essentially the Wildcat Bedrock Valley as defined by Wayne (1956).

The Tippecanoe Bedrock Valley Section generally underlies the course of the present Tippecanoe River. It is the same as the upper part of Wayne's (1956, fig. 3) Otterbein Valley in northeastern White

County. It merges with the broad Bass Lake Lowland Section, which includes the low elevations once thought of as a possible Lake Michigan-Wabash River valley connection by Leverett (1895).

The Metea Valley Section, extending generally from near Columbia City to Logansport, is essentially the Metea Valley as defined by Wayne (1956).

The Logansport Bend Section is that northernmost bend of the trunk valley that connects the Battle Ground Lowland Section with the Metea and Marion Valley Sections. This bend section is necessarily distinguished from the Marion section because the valley-fill stratigraphy of the latter significantly differs from that in and downstream from the bend.

The Linden Valley Section is a relatively high level northeast-southwest valley north of Crawfordsville. It appears to be the equivalent of the upper segment of the Danville Valley of Wayne (1956, fig. 8). The term "Mahomet Valley Section" is applied here only to the western part of Wayne's Danville Valley.

EASTERN VALLEYS

The Marion Valley Section of the Lafayette system is that part of the trunk valley above (east of) the juncture of the Metea valley. Its Peru, La Fontaine, and Geneva Segments are separated by the unnamed slight bend at Rich Valley, near Wabash, and by the named Hartford City Bend and St. Marys Bend Segments. Historically, the Marion section is the embodiment of the Teays concept in Indiana, and it includes various early concepts of the ancestral Wabash, the deep drive, and the Loblolly. The segments are distinguished partly to provide convenient geographic reference (straight segments separated by bends), partly to emphasize differing characteristic morphology (as the narrow Geneva Segment, which has a characteristic deep, steep valley profile and apparent dearth of significant tributaries [see Gray, in preparation]), and partly to facilitate discussion of major differences in composition of the valley fill within each segment.

The Anderson Valley Section is that narrow valley segment extending generally between Anderson and Tipton. The term is restricted to the upper part of Wayne's (1956, fig. 8) Anderson Valley.

The Newcastle Valley Section (redefined from Gray, in preparation) appears to be the southeastern extension of the Anderson, connecting the latter with the modern Whitewater River valley and, ultimately, with the Ohio River valley. The south branch of the valley of Gray (1983) is part of the upper Whitewater Valley of Wayne (1956, fig. 8).

The Noblesville Valley Section is a pair of valleys

bisecting an upland connecting the Frankfort lowland and the buried extension of the Scottsburg Lowland (as mapped by Wayne, 1956) that underlies Indianapolis.

The Winchester Valley Section is essentially a redefinition of the Priam Valley as defined by Wayne (1956, fig. 8). (The name "Priam" is now officially "Trenton" on modern maps (U.S. Geological Survey 7 1/2-minute Pennville Quadrangle, 1960.) The valley is now well defined near Winchester, for which the valley is renamed.

SILLS OF THE MAUMEE-WABASH TROUGH

The modern Wabash River below Huntington occupies a trough that extends from Fort Wayne, through the Wabash-Erie Channel,⁵ and through the Great Bend of the Wabash below Attica (pl. 2). This great Maumee-Wabash Trough⁶ formed in glacial and immediately postglacial time and ultimately carried the flood discharges of glacial Lake Maumee.

The histories of development of the modern Wabash River, the trough in which it flows, and all earlier drainage systems must be considered together because younger drainages partially reoccupied old valleys (if only by chance crossing) and because deposits of these more recent drainages are commonly inset into deposits of the older drainages. Some of the Lafayette Bedrock Valley System is now occupied by air that fills the present inset parts of the Maumee-Wabash Trough, and much is occupied by relatively young glacial and glacial-fluvial deposits of Wisconsinan and possibly pre-Wisconsinan age that

fill inset parts of an older Wabash River valley. Within those areas of inset, morphologic and stratigraphic interpretations must be tied to a knowledge of controls of the lowest possible Wabash grades—the rock sills of the modern Wabash. (See Dryer, 1920, for an interesting early synthesis.) These sills are notches in the rock surface and are considered part of the Lafayette Bedrock Valley System (pls. 1 and 2). They include the sills at Independence,⁷ Logansport, and Huntington⁸ and the sill made up of klintar above Lagro.⁹ All sills were crossed by the original Wabash that flowed from glacial Lake Maumee; only the former two are crossed by the present Wabash River.

STRATIGRAPHY AND VALLEY HISTORY

The nature of the fill of the valley parts provides another basis, as well as the justification, for characterizing and defining parts of the Lafayette system. For example, the most significant change of valley-fill materials in the Marion-Mahomet trunk valley occurs just above the entrance of the Metea. Therefore, the stratigraphic change at that juncture is part of the rationale for the separation of the Marion from all sections downstream. The Marion section is filled, rock rim to rock rim, with relatively fine grained lake and outwash sediments associated with a gray loam till on the east (nearest Wilshire, Ohio) and with a red-claystone-bearing red till on the west. These sediments are the result of glacial damming of the Marion section and are the oldest materials filling the Lafayette system. The red till presumably is the same as the oldest till of west-central Indiana, known par-

⁵This term was adapted by Bleuer and Moore (1972) from Dryer (1889) for the poorly drained section now occupied only by the Little River.

⁶The term formalized here is from Dryer (1920); it is the same as the Wabash sluiceway of Thornbury (1958).

⁷The sill near Independence was the south rim of the great basin described by Gorby (1886, p. 76-77) in central Tippecanoe County. "In the low bottoms of the Wabash River, opposite Black Rock, the St. Louis limestone lies just under the soil, at a depth of from six inches to three feet. The river bed at this point is solid rock, and at low-water there is but two to three feet of water in the channel here. The stream is easily forded. The bottom of the ancient basin at Lafayette is at least one hundred feet lower than the river bed at this point, and fully three hundred feet below the summit of Black Rock. * * * It is probable that if the great covering of Drift was removed from the northern half of Indiana, an immense system of great river channels and scooped-out basins would be revealed that would put to shame the shallow streams and puny lakes that are seen on the surface of same region to-day."

⁸The level of the sill at Huntington has traditionally been considered a dominant control of the levels of glacial Lake Maumee. (See the discussion in Bleuer and Moore, 1972.)

⁹Between Huntington and Lagro (pl. 2) the modern Wabash threads between exhumed Silurian bioherms, the klintar, in an area that has been believed to be miniature scabland (Thornbury, 1958).

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ticularly from the West Lebanon area. The latter till is associated with sediments that exhibit reversed remanent magnetism (Bleuer, 1976) and high amino-acid racemization values (implying old) for associated mollusks (Miller and others, 1987). The till is presumed to be more than 730,000 years old (Bleuer, in preparation). And in contrast, other sections, such as the Tippecanoe and Wildcat valleys and the parts of the Battle Ground lowland, contain an inset stratigraphy that is very young. Within these valleys the elevations of basal Wisconsinan materials, the Fairgrange and Snider Till Members of the Wedron Formation and tills of the Trafalgar Formation (see Johnson, 1976; Bleuer, 1975; Bleuer and others, 1983), and of the Sangamonian soil are similar to elevations of the flood plain of the modern Wabash River. The Wisconsinan base in these valleys defines a grade similar to that of the present Wabash River,

for which cutting is limited by the elevation of the sill at Independence.

Recognition of these valley segments as morphologic entities containing distinct stratigraphic successions provides the basis for determining the sequential development of the larger valley systems.

DRAINAGE SYSTEMS IN TIME

Previous concepts of the development of drainage systems through time have been simple and have paralleled the elementary knowledge of the buried bedrock valleys and elementary concepts of glacial stratigraphy. The surface Teays (in West Virginia and Ohio) must have drained somewhere; it drained into whatever buried valley, known by whatever name, that was best known at the time. Yet it was also recognized that glacial advances must have modified

Table 2. Divisions of the Maumee-Wabash Trough and of the Wabash River valley

Valley reach	Rock-valley segment
Wabash-Erie Channel ¹ (Fort Wayne to Huntington)	Sill at Huntington
Upper Wabash River valley ² (Huntington to Logansport)	Klinter above Lagro Sill at Logansport
Middle Wabash River valley ³ (Logansport through the Great Bend)	Sill at Independence

¹This is now occupied by the Little River, which flows westward from a drainage divide at Fort Wayne.

²The course of the upper Wabash River above Huntington is determined by its position afront the Wabash Moraine.

³The middle Wabash River valley extends southward to Terre Haute. Below the Great Bend it lies within and atop the Wabash Bedrock Valley Section. Thornbury (1958) and others have termed all the Wabash River valley above Terre Haute the "upper Wabash Valley."

Table 3. Relationships of drainage stages to valley-fill stratigraphy and to interpreted drainage systems through time

Drainage stage	Drainage system	Exit depth	Valley-fill stratigraphy	Valley filled	Marine isotopic stage ¹
1	Marion-Mahomet, the so-called Teays	350 ft			22
			Basal gravel, unnamed tills of the Wilshire (Ohio) area; unnamed till of east-central Indiana similar to till of the West Lebanon area, west-central Indiana	Marion valley	22
			Basal gravel, Mahomet Sand Member (Jessup Formation) ²	Logansport bend, Battle Ground lowland, Mahomet valley	
2	Metea-Mahomet	< 400 ft			19-21
			Harmattan Till Member (Banner Formation) ²	Mahomet valley	19-21
			Mahomet Sand Member (Jessup Formation) ²		
3	Metea-Wabash? via Attica cutoff or Danville valley	< 400 ft			?
			Hillery Till Member (Jessup Formation) ²	Attica cutoff	?
4	Metea-Mahomet	?			16-18
			Unnamed till of the Brookston area (equivalent to Tilton Till? Member (Jessup Formation) ²	Logansport bend, Battle Ground lowland	16-18
5	Mahomet	?			6
			Vandalia Till Member (Glasford Formation) ²	Mahomet valley	6

Table 3. Relationships of drainage stages to valley-fill stratigraphy and to interpreted drainage systems through time—Continued

Drainage stage	Drainage system	Exit depth	Valley-fill stratigraphy	Valley filled	Marine isotopic stage ¹
6	Tippcanoe and Metea into the Wabash via sill at Independence or Attica cutoff	480 ft (sill level)			3-5
			Fairgrange and Snider Till Members (Wedron Formation); tills of Trafalgar Formation ³	Tippcanoe, Metea, middle and upper Wabash River valleys	2
7	Modern Wabash via Maumee-Wabash Trough into lower Wabash through sill at Independence	480 ft (sill level)			1
			Modern atmosphere	Modern Wabash	1

¹ Shackleton and Opdyke (1976).

² Pre-Wisconsinan units of eastern Illinois (Johnson, 1976); equivalents recognized in Indiana; the Hillery and Tilton Till Members and the Mahomet Sand Member of the Banner Formation in Illinois are considered members of the Jessup Formation in Indiana on the basis of eastern-source composition (Bleuer and others, 1983; Bleuer, in preparation).

³ Wisconsinan till units of eastern Illinois and western Indiana (Bleuer, 1975).

drainage in those valleys and that parts of the overall Teays system must have been successively reoccupied. The concepts included: (1) the interglacial origins of the exposed deep stage (Ver Steeg, 1936) and a similar interglacial reoccupation and deepening of an extant lower Teays after damming of the upper Teays (Thornbury, 1948); (2) the interglacial formation of a Teays-Mahomet valley through glacial diversion of a northward-flowing Teays in Ohio (Coffey, 1961); and (3) the post-deep stage, the so-called "Mahomet" valleys of Wayne (1952, p. 584) (interglacial reoccupations of the Wabash, not of the type Mahomet), a concept that derived from a more general idea that "during each succeeding glaciation * * * the Mahomet River * * * must have been shunted at least for a short time through the Wabash Valley" owing to glacial damming of the Mahomet Valley in Illinois (Wayne, 1956, p. 54). All of these concepts have provided background for present thought.

The common admonition that "the simplest explanation is most likely the correct explanation" must be rejected a priori. Morphology and valley-fill stratigraphy of the valley segments are complexly interrelated, and therefore the morphology of the valley systems can have a number of equally rational, perhaps very complicated explanations. Parts of the Lafayette Bedrock Valley System might ultimately be interpreted, as they have been previously, as components of Teays-Mahomet or Teays-Wabash drainage systems. But just as logically, drainage from the Marion, Anderson, Metea, or Tippcanoe valleys, alone or in combination, could have exited through the Mahomet, Danville, or Linden valleys, through the Attica cutoff, or across the sill at Independence in many combinations.

Individual valley sections or segments defined above are strictly physically defined features. The term "Teays Valley" applies to just such a feature in West Virginia. Conceptual regional drainage systems,

in contrast, should be designated according to an event or stage assigned relative to stratigraphic sequence of the valley fill. An outline of such a scheme presented here (table 3) relates hypothesized drainage stages, in numbered chronologic sequence, to valley routes and to the valley-fill stratigraphy that defines that sequence. This outline is, in fact, a highly tentative pre-summary of work in progress (Bleuer, in preparation, and other planned reports), and much of it is included for future cross reference rather than for discussion here. But the stratigraphic relations summarized in the previous section form the primary basis for the outline, and through these the intent of the scheme can be seen. For example, although the use of the term "Teays" in reference to any bedrock valley in Indiana is abandoned, the concept is retained in the use of the descriptive term "Marion-Mahomet drainage system." This system is considered to have been part of the larger Teays-Mahomet system, following the common assumption that drainage of the type Teays of Ohio and West Virginia probably did follow the route of the Marion and Mahomet Valley Sections through Indiana at some time. Such a continuous valley probably existed before marine isotopic stage 22 (Bleuer, in preparation), and it ceased to exist after the glacial damming and filling of the Marion section during that stage. But multiple through-flowing Teays events may have occurred before the blockage of the Marion valley, emanating either from the type Teays Valley in West Virginia or (following Ver Steeg or Coffey) emanating from sources in Ohio not related to the type Teays at all.

Several drainage systems must have occupied lower parts of the Lafayette Bedrock Valley System after blockage of its Marion Valley Section (table 3). These finally included an early form of the modern Wabash River valley that existed during and before Sangamonian interglacial time (marine isotopic stage 3) and that consisted of the Tippecanoe valley and possibly the Metea valley draining into the middle Wabash River valley. This drainage system ceased to exist when those tributary valleys were plugged with drift during Wisconsinan time (marine isotopic stage 2).

SUMMARY

The Lafayette Bedrock Valley System is that system of bedrock valleys that converge on and diverge from Lafayette, Ind. All earlier discussions of the history of drainage within that system are now considered moot; only analysis of the stratigraphy of valley fill of the several valley sections can provide

any basis for the interpretation of drainage systems through time. Yet we must realize that the relative sequence of valley filling evidenced by the stratigraphy records only a sequence of last use. Little basis exists for determining what came before.

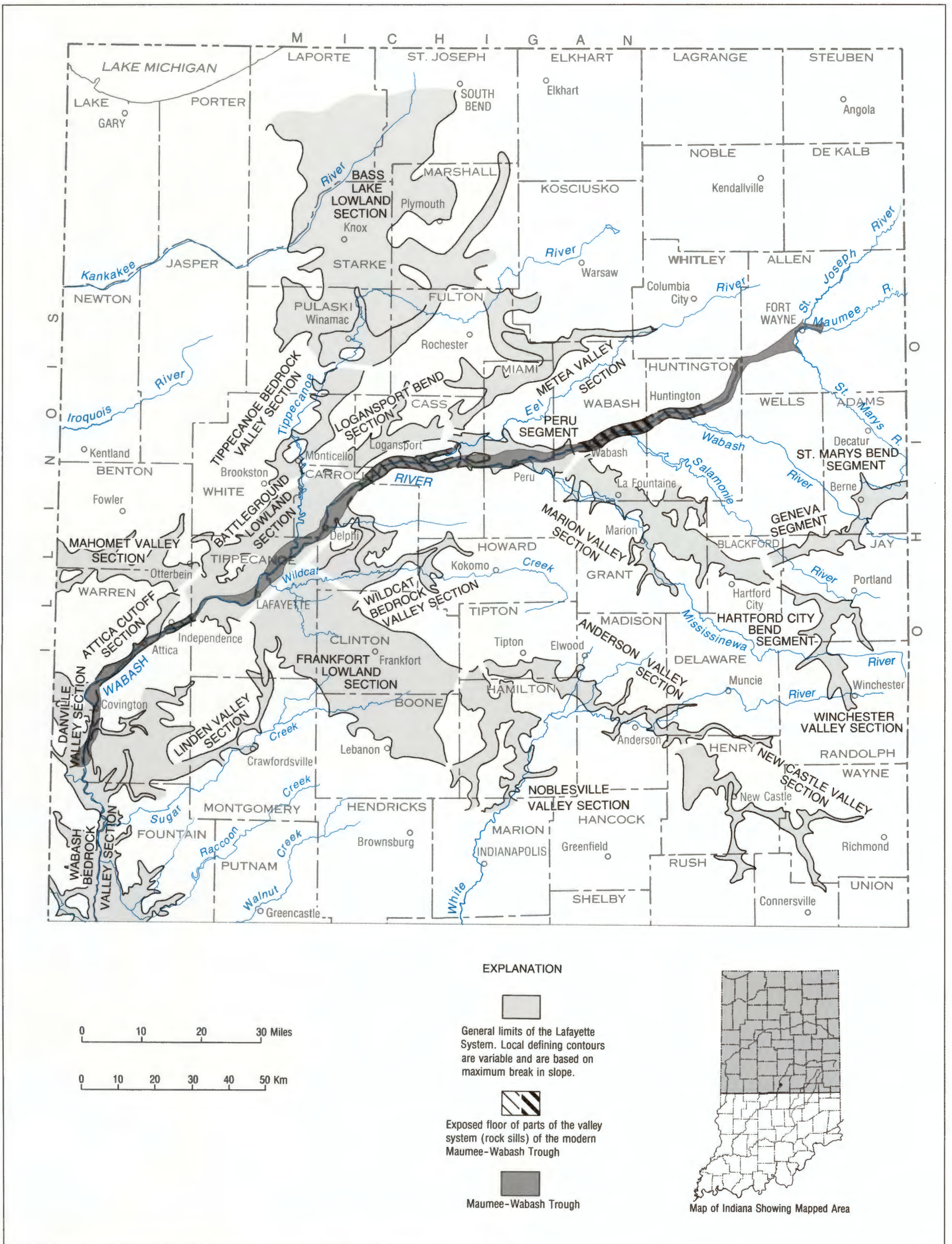
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OVERSIZED DOCUMENT

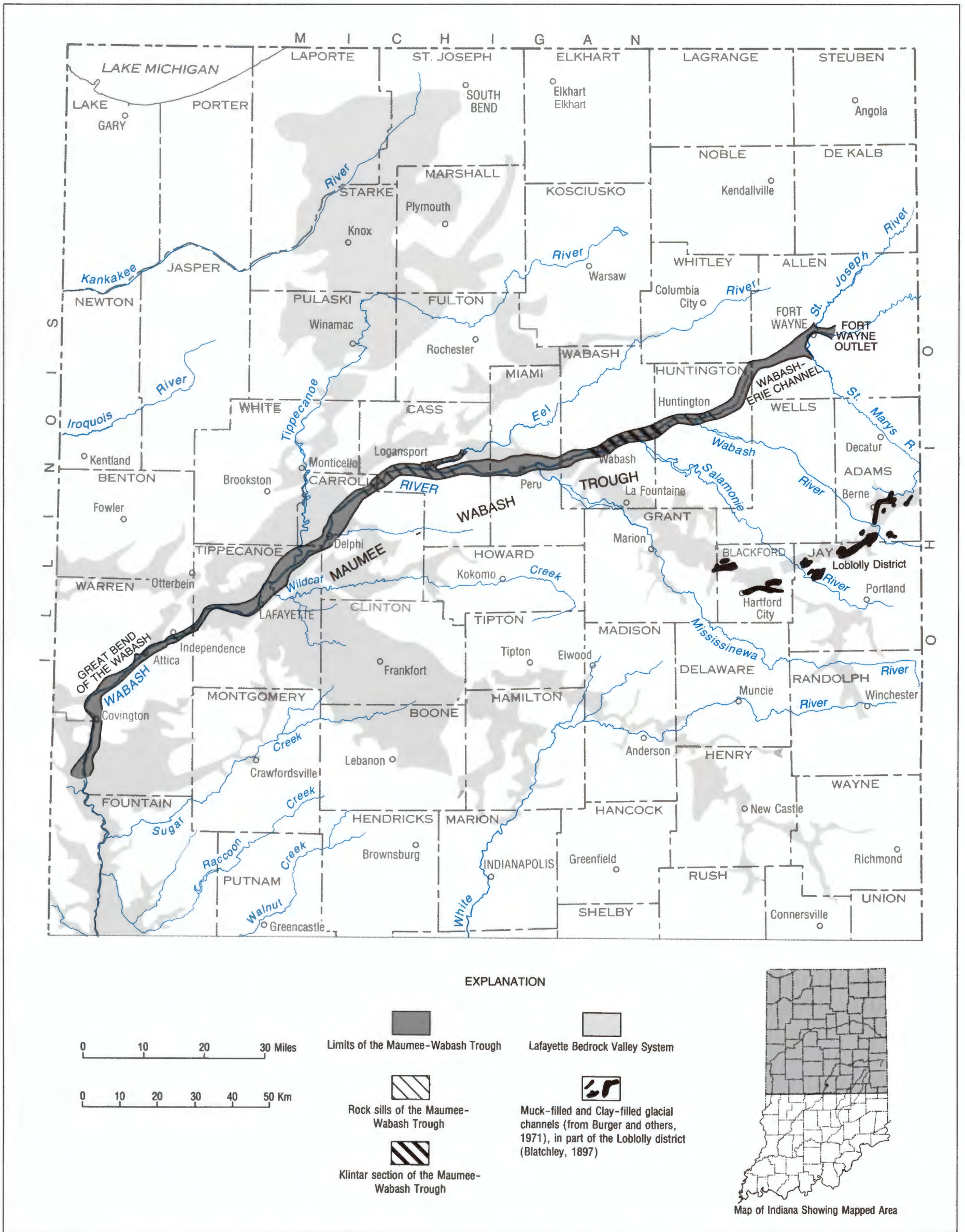
**The following pages are oversized and
need to be printed in correct format.**



Base map and valley boundaries are generalized from Gray (1983)

MAP OF NORTH-CENTRAL INDIANA SHOWING LAFAYETTE BEDROCK VALLEY SYSTEM

Drafted by Rea E. W. Kersey



MAP OF NORTH-CENTRAL INDIANA SHOWING MAUMEE-WABASH TROUGH RELATIVE TO LAFAYETTE BEDROCK VALLEY SYSTEM

Drafted by Rea E. W. Kersey