

GEOLOGY

Physiographic Region

The Big River basin (Figure nd) lies within two subdivisions (Salem Plateau and St. Francois Mountains) of the Ozark Plateau physiographic region (MDNR 1986). Land elevations range from 435 feet above sea level at the mouth of Big River to 1,740 feet in the headwaters at Buford Mountain.

Geology

The Big River basin contains geologic formations (Figure ge) ranging in age from Mississippian to Precambrian. The majority of basin streams flow through the Salem Plateau, which is a dissected plateau of sedimentary rock topped by a thin layer of glacial loess. This plateau commonly forms rolling to narrowly-cut river valleys. As Big River flows northward, it cuts through progressively younger limestone and dolomite. Despite Karst topography being locally prominent, few springs are present. Sandstone is common in Jefferson County and shale becomes prominent in the lower basin.

Substantial deposits of lead, zinc, copper, magnesium, and barite have attracted mining operations to Jefferson, St. Francois, and Washington counties beginning over 200 years ago (MDNR 1984).

The southeastern portion of the basin drains the northern edge of the St. Francois Mountains which feature rugged, igneous peaks thought to be unaltered from their time of creation. Since these formations are highly-resistant to erosion, streams tend to be high gradient and form very narrow river valleys through thin residuum.

Soil types

Discussion of soil types is limited due to unavailability of soil surveys for Jefferson and Washington counties (68% of watershed). Primary soil series in the upper watershed include: Crider, Fourche, and Hildebrecht on ridge tops; Gasconade, Goss, and Irondale on slopes; and Haymond and Midco in the bottoms (USDA 1981, 1985, 1989, 1991). Soils on ridgetops and slopes are highly erodible, especially when disturbed.

Upper basin soils are typical for the Ozark Dome region, while lower basin soils reflect the Ozark border region (MDNR 1986). Upland soils are moderately shallow and consist of a combination of loess and residuum derived from in-place weathering of dolomite. These soils are silty, moderately well drained, highly susceptible to erosion, and suitable for pasture, forest, and limited row cropping (USDA 1981, 1985, 1989, 1991). However, much of the loess and residuum has been eroded from the slopes, exposing much chert and frequent bedrock outcrops.

The lower elevations of these soils tend to be clayey with high chert content, thin, draughty, infertile, and stony, best suited for grasslands and forest (USDA 1981, 1985, 1989, 1991). Very fertile silt-loam, developed from alluvium, has been deposited over cherty gravel in river valley bottoms and is suitable for row crops, bottomland forest, and pasture.

Stream Order

Big River becomes a sixth order stream at its confluence with Cedar Creek at river mile (RM) 118 in Washington County. A total of 86 streams (\geq order 3) were identified, ordered, and measured (Appendix 1) from USGS 7.5-minute topographic maps (Appendix 2).

There are 129 miles of permanent streams and 220 miles of intermittent streams in the basin (Funk 1968).

Watershed Area

The Big River watershed encompasses 955 square miles. Main sub-basins (Order 5) range from 26 to 189 square miles, with the largest being Mineral Fork (Table 1).

Channel Gradient

Big River's average gradient is 6.6 ft/mile and ranges from 1.3 (RM 34) to 200 (RM 137). Generally, stream gradient is steepest in the St. Francois Mountain area and more gradual beginning at RM 85 to the confluence with the Meramec River.

Appendix 1: Stream information for all third order and larger streams in the Big River basin.

Stream Name	Max. Order	Watershed Area (sq.Mi)	Length (miles)
Big River	6	955	1.38
Heads Creek	5	52	7.7
Dulin Creek	4		2.4
Bear Creek	3		2.3
Bourne Creek	3		3.4
Sand Creek	4		2

Appendix 1 continued.

Buck Creek	4		2.9
Dutch Creek	3		1.4
Wine Creek	3		0.7
Skullbones Creek	3		2.2
Isum Creek	3		0.5
Belew Creek	5	73.2	6.9
Galligher Creek	3		1.1
Jones Creek	3		4.8
Dry Creek	5	54	9.6
Kruze Creek	3		0.7
Maupin Creek	3		2.1
Ditch Creek	3		3.3
Cedar Hollow Cr.	3		0.8
Calico Creek	3		1.5
Mammoth Creek	3		1.3
Mineral Fork	5	189	15.4
Old Mines Creek	3		7.7
Rocky Branch	3		3
Simpson Branch	3		3.4
Mine a Breton Cr.	4		13.3
Swan Branch	3		4.6
Bates Creek	4		8.5
Fourche a Renault Cr.	4		11.6
Puckett Branch	4		3.8
Ebo Creek	3		4.1
Scott Branch	3		4.4
Mill Branch	3		4
Montgomery Creek	3		3.8

Appendix 1 continued.

North Fork	3		4
North Fork - Fourche a Renault	3		4.4
Allen Branch	3		4.9
Andrews Branch	3		2.6
Middle Fork-Fourcha Renault	3		4.5
Maddin Creek	3		0.7
Tiff Creek	3		2.9
Mill Creek	5	51.7	13.3
Three Hill Creek	4	6.5	83
Primrose Creek	3		3.6
Pond Creek	3		5.3
Cabanne Course	3		6
Shibboleth Branch	3		4.9
Turkey Creek	3		3.3
Coonville Creek	4		3.7
Bee Run	3		4.8
Terre Bleue	5	66.8	21.7
Dry Branch	3		4.5
Hazel Run	3		5.3
Salem Creek	4		5.6
Three Rivers Cr.	3		5
Bear Creek	3	40	4.2
Flat River	5	53	14.9
Koen Creek	4		6
Bannister Branch	3		2.7
Owl Creek	3		3.8

Appendix 1 continued.

Hayden Creek	3		3.9
Hopewell Creek	3		4
Wallen Creek	3		6.3
Dry Creek	3		8.3
Mill Creek	3		6
Cedar Creek	5	79.2	14.1
Lost Creek	3		7
Goose Creek	3		4.1
Bellview Branch	4		5
Logan Creek	3		4.3
Townsen Creek	3		3.9
Saline Creek	4	* 19.5	3.8
Reid Creek	3		6.3
Coon Hollow	3		4.5
Furnace Creek	3		4.4
Clear Creek	4		7.3
Brock Creek	3		5.8
Janes Creek	3		5.1
Telleck Branch	3		3.5
Fountain Farm Branch	3		4.8

* = NRCS, pers. comm.

Appendix 2. United States Geological Survey Topographic maps (scale 1:24,000) used for determining watershed areas, river mileage, and stream order.

Banner, MO - 1968	Belew Creek, MO - 1974
Belgrade, MO - 1958	Bonne Terre, MO - 1982
Cedar Hill, MO - 1974	DeSoto, MO - 1981
Ebo, MO - 1981	Farmington, MO - 1982
Flat Creek, MO - 1982	Fletcher, MO - 1981
French Village, MO - 1964	Graniteville, MO - 1968
Halifax, MO - 1982	House Springs, MO - 1982
Irondale, MO - 1982	Johnson Mtn., MO - 1968
Lawrenceton, MO - 1982	Mineral Point, MO - 1982
Old Mines, MO - 1981	Pacific, MO - 1974
Potosi, MO 1982	Shirley, MO - 1958
Tiff, MO - 1981	Vineland, MO - 1981

Table 1. Watershed area of Big River's major tributaries.

Stream	(sq. Mi)	(acres)
Mineral Fork	189	120,960
Cedar Cr.	79	50,666
Terre Bleue Cr.	67	42,755
Flat River	53	33,920
Mill Cr.	52	33,080
Heads Cr.	30	19,440
Dry Cr.	30	18,930
Belew Cr.	26	16,620

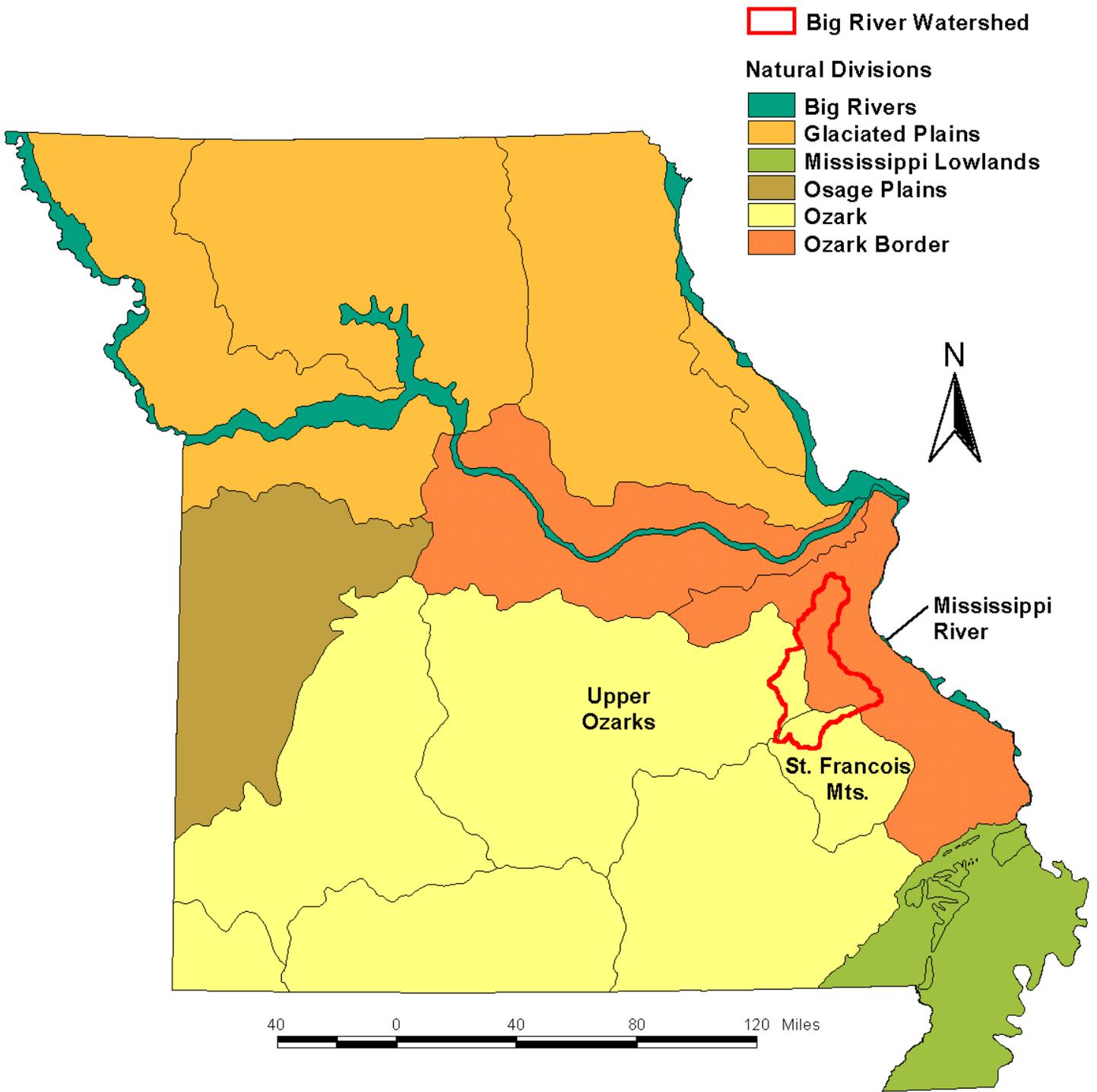


Figure nd. Natural divisions of the Big River basin in Missouri.

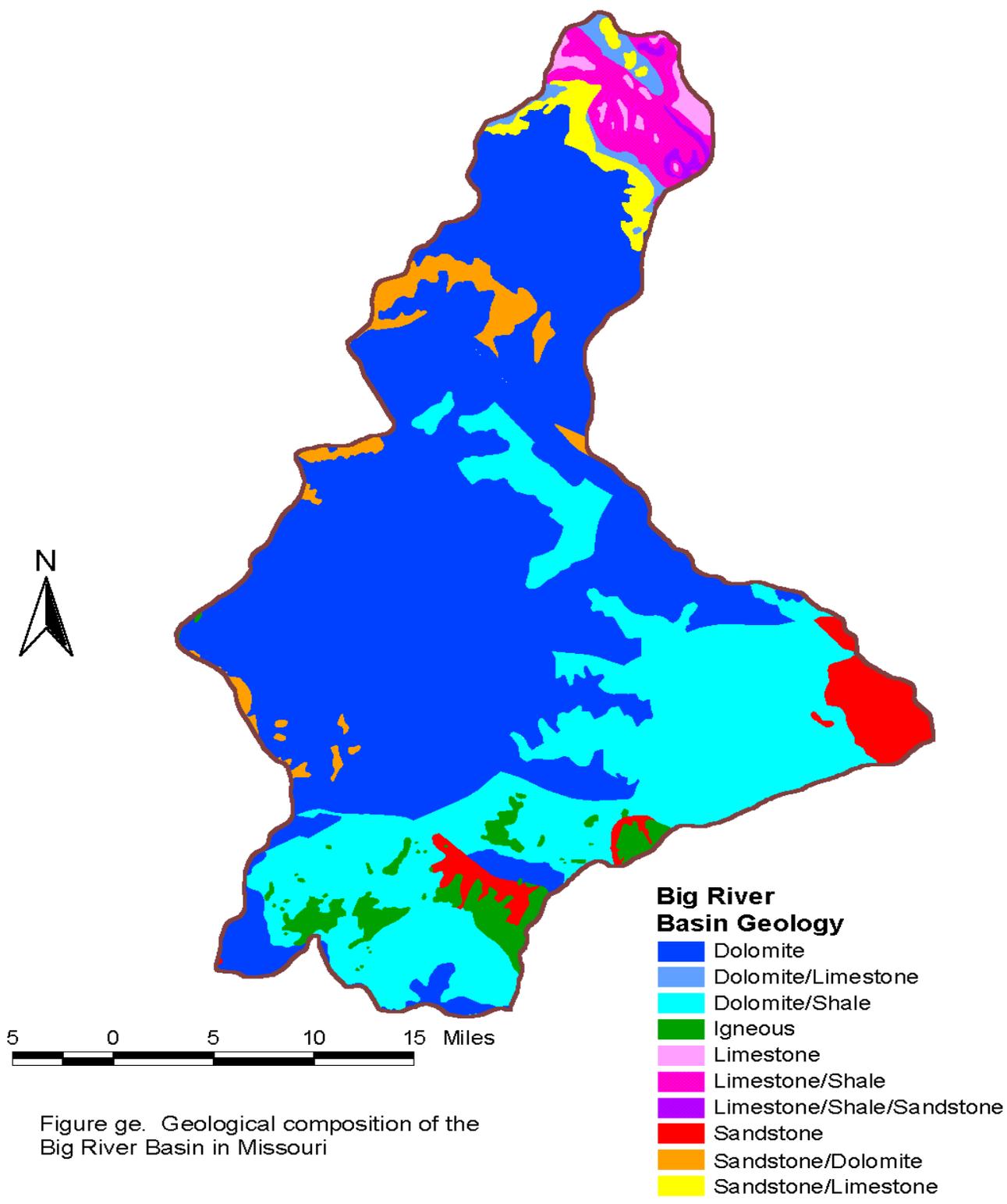


Figure ge. Geological composition of the Big River Basin in Missouri