

GEOLOGY

PHYSIOGRAPHIC REGIONS

The [Spring River Basin](#) is located along the border between the Osage Plains and the Springfield Plateau (MDNR 1986).

The Osage Plains are a subdivision of the Central Lowland Physiographic Region and encompass the northwest portion of the Spring River Basin. This is an unglaciated area of smooth to rolling plains with low relief formed on Pennsylvanian sedimentary rock (MDNR 1986).

The Springfield Plateau forms the western-most member of the three subdivisions of the Ozark Plateau and encompasses most of the Spring River Basin. Elevations range from 1,000 to 1,700 feet above mean sea level (msl). Mississippian limestones underlay the region, and karst features are locally prominent.

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The southern and eastern portions of the Spring River Basin, including the eastern and southern portions of the North Fork of the Spring River watershed and the Turkey Creek, Shoal Creek, and Center Creek watersheds, have surface layers comprised primarily of [Mississippian age limestones](#) (MDNR 1984). A few remnants of Pennsylvanian sandstones and shales are dispersed throughout this area. A substantial portion of this area lies in the Burlington-Keokuk limestone within which most springs in the area are formed. Springs are relatively common, but generally low yielding ([Table 1](#), Figures 2A-F). Base flows are well sustained during dry periods.

The northwest portion of the basin, which makes up the western portion of the North Fork of the Spring River watershed, lies within deposits of shale, sandstone, siltstone, limestone, clay, and coal of Pennsylvanian age (MDNR 1984). Springs are poorly developed, infiltration to subsurface strata is limited, and base flows are poorly sustained during dry periods.

SOIL TYPES

Three major soil regions are represented within the Spring River Basin; these are Cherokee Prairies, Ozark Borders, and Ozarks (MDNR 1986). Alluvial soils along major stream courses are assigned to the Cherokee Prairies category.

Soils in the Cherokee Prairies region historically supported native vegetation comprised primarily of prairie grasses. These soils range from acidic, poorly drained soils to soils which are excessively well drained, droughty, and infertile.

Ozarks soils are variable, and productivity encompasses a wide range. Ozarks soils may be stone free, but stone content can exceed 50 percent in some areas. Loess capped soils and soils located in valleys may be fertile and support improved pastures and grain farming.

The Ozark Borders region contains both forest soils and areas of transition between forest and prairie derived soils. Slope, parent materials, climate, and landforms all contribute to a wide variety of distinct soil types in this region.

Soil erosion ranges from 5 to 9 tons/acre/year from sheet and rill erosion on tilled lands, 2.5 to 5

Missouri Natural Divisions map.

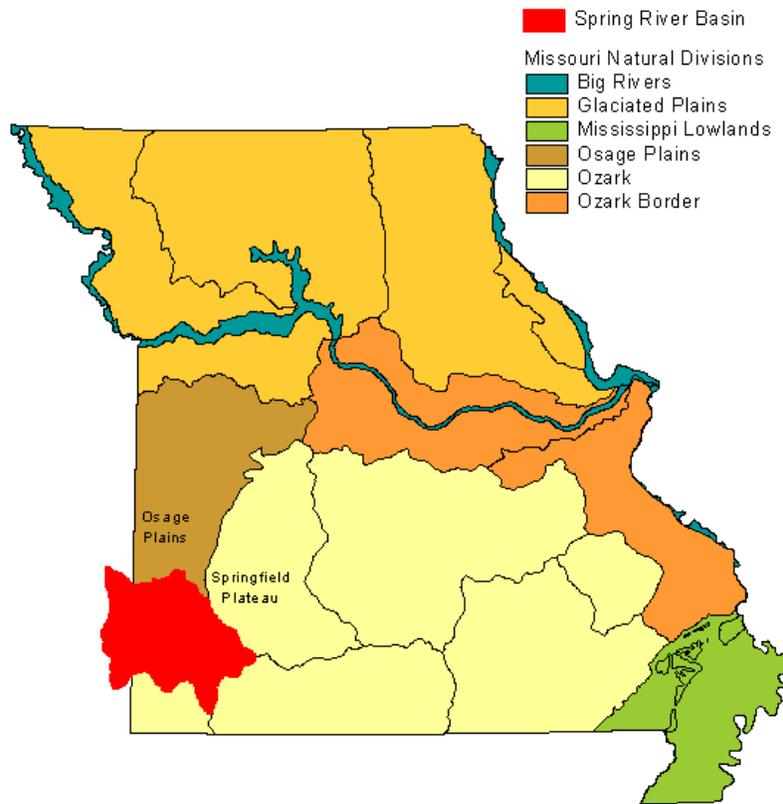


Table 1. Springs of the Spring River Basin.

SPRING NAME	NEAREST TOWN	COUNTY	T R S
Bartholic Spring*	Neosho	Newton	24N 31W 7
Bartoski Spring*	Fairview	Barry	24N 29W 3
Big Spring*	Neosho	Newton	25N 31W 19
Big Spring*	Mt Vernon	Lawrence	28N 27W 28
Boy Scout Spring*	Joplin	Newton	26N 32W 9
Button Spring*	Sarcoxie	Newton	27n 29w 21
Cave Spring	Sarcoxie	Jasper	28n 29w 26
Cave Spring*	Pierce City	Newton	25n 29w 11
Clarkson Spring*	Stotts City	Lawrence	27n 28w 17
Elm Spring*	Neosho	Newton	24n 31w 12
Fly Spring*	Purdy	Barry	24n 28w 16
Haddock Spring*	Sarcoxie	Newton	27n 29w 27
Hawkins Spring*	Pierce City	Barry	25n 29w 12
Hearrel Spring*	Neosho	Newton	25n 31w 30
Linn Spring	Sarcoxie	Newton	27n 29w 23
McMahan Spring*	Neosho	Newton	25n 31w 28
Means Spring	Pierce City	Barry	25n 28w 16
Monark Spring*	Neosho	Newton	25n 31w 26
Pierce City Spring*	Pierce City	Lawrence	26N 28W 20
Pioneer Spring*	Fairview	Barry	25N 29W 36
Polk Spring*	Marionville	Lawrence	27n 25w 22
Sagamount Spring*	Joplin	Newton	26N 32W 5
Talbert Spring*	Exeter	Barry	23n 28w 28
Unnamed*	Exeter	Barry	23n 28w 19
Unnamed	Fairview	Barry	24n 29w 10
Unnamed	Pierce City	Barry	25n 29w 12
Unnamed	Pierce City	Barry	25n 29w 12
Unnamed	Wheaton	Barry	24n 28w 30
Unnamed	Wheaton	Barry	24n 28w 33
Unnamed	Wheaton	Barry	23n 28w 6
Unnamed	Wheaton	Barry	24n 29w 14
Unnamed	Wheaton	Barry	24n 29w 14
Unnamed	Wheaton	Barry	24n 29w 23
Unnamed*	Wheaton	Barry	24n 29w 25
Unnamed	Sarcoxie	Jasper	27n 29w 9
Unnamed	Sarcoxie	Jasper	27n 30w 11
Unnamed	Miller	Lawrence	28n 26w 5
Unnamed	Stotts City	Lawrence	27n 28w 17
Unnamed*	Verona	Lawrence	26n 26w 17
Unnamed*	Granby	Newton	26n 30w 29
Unnamed	Granby	Newton	26n 31w 27
Unnamed	Joplin	Newton	27n 34w 27
Unnamed*	Newtonia	Newton	25n 29w 8
Unnamed	Newtonia	Newton	25n 29w 9
Unnamed	Newtonia	Newton	25n 29w 10
Unnamed	Newtonia	Newton	25n 29w 10

SPRING NAME	NEAREST TOWN	COUNTY	T R S
Unnamed	Newtonia	Newton	26n 29w 28
Unnamed	Ritchey	Newton	26n 29w 19
Unnamed	Ritchey	Newton	26n 29w 20
Unnamed*	Ritchey	Newton	26n 29w 32
Unnamed	Ritchey	Newton	26n 30w 21
Unnamed	Ritchey	Newton	26n 30w 23
Unnamed	Ritchey	Newton	26n 30w 27
Unnamed	Ritchey	Newton	26n 30w 27
Unnamed	Ritchey	Newton	26n 30w 27
Unnamed	Sarcoxie	Newton	27n 29w 27

tons/acre/year from sheet and rill erosion on permanent pasture, less than 0.25 tons/acre/year from sheet and rill erosion on non-grazed forests, and 100 to 199 tons/square mile from gully erosion.

Approximately 1.4 tons of sediments/acre/year actually reach impoundments and streams within the basin. The sources of eroded sediment are derived as followed: 76% from sheet and rill erosion; 14% from gully erosion; 3% from streambank erosion; and 7% from urban and built-up areas (Anderson 1980).

STREAM ORDER

Stream orders were assigned to all streams in the Missouri portions of the basin using 7.5 minute topographic maps. There are a total of 144 third order and larger streams in the basin. Of this total, 111 are third order, 20 are fourth order, six are fifth order, three are sixth order, and one (Spring River) reaches seventh order before leaving Missouri. Total stream mileages by order are: 1) third order - 593.8 miles; 2) fourth order - 256.8 miles; 3) fifth order - 106.7 miles; 4) sixth order - 225.0 miles; and 5) seventh order - 128.3 miles. Overall, third order and larger streams in the Missouri portion of the basin total 1,310.5 miles. The major streams in the basin, with their respective lengths and orders are listed in [Table 2](#).

WATERSHED AREA

The basin has been divided into five major sub-basins, Upper Spring River, Lower Spring River/Center Creek, Shoal Creek, and upper and lower North Fork of the Spring River (Figures 2A-F). Table 2 contains watershed areas for fifth order and larger streams in the basin summarized from Funk (1968) or as determined using available 1:100,000 scale topographic maps. The Spring River and its tributaries drain approximately 2,271 square miles in Missouri. The three sixth order streams, North Fork of the Spring River, Shoal Creek, and Center Creek drain 640, 472, and 302 square miles, respectively. The fifth order streams have watersheds ranging from 39 to 100 square miles.

CHANNEL GRADIENT

Stream gradient plots for all third order and larger streams were produced using U.S. Geological Survey (USGS) 7.5 minute topographic maps. This information is available from the Missouri Department of Conservation's (MDC) Southwest Regional Office in Springfield, MO. Average gradients were calculated for third order and larger reaches of the Spring River, North Fork of the Spring River, Shoal Creek, and Center Creek ([Table 3](#)).

Channel gradients reflect the transitional Ozarks/Prairie topography of the basin. The higher gradients of Shoal Creek are more typical of those found in Ozark streams, while the lower gradients of the North Fork of the Spring River are more typical of a prairie stream. The gradients for Spring River and Center Creek are intermediate between the two.

Table 3. Average gradients and percent slopes for stream reaches third order and larger on the Spring River, North Fork of the Spring River, Center Creek, and Shoal Creek.

<u>Stream Name</u>	<u>Order</u>	<u>Avg. Gradient (ft/mile)</u>	<u>Percent/Slope</u>
Spring River	7	2.33	0.42
	6	4.87	.092
	5	6.27	.119
	4	11.65	.221
	3	26.32	.498
North Fork Spring River	6	1.88	.036
	5	3.96	.075
	4*	<10.00*	<.189*
	3	22.22	.421
Shoal Creek	6	5.72	.108
	5	7.01	.133
	4	14.24	.270
	3	32.79	.621
Center Creek	6	5.23	.099
	5	7.26	.138
	4	13.08	.248
	3	21.05	.399

***No contour lines transect this reach of the North Fork of the Spring River.**

Table 2. Orders, total lengths, and watershed areas for major streams in the Spring River Basin.

<u>Stream Code</u>	<u>Name</u>	<u>Order</u>	<u>Length(mi)</u>	<u>Area(mi²)</u>
61220000	Spring River	7	125.0	2,271
61214000	Center Creek	6	65.9	302
61225000	N. Fork Spring R.	6	80.7	640
61212000	Shoal Creek	6	78.4	472
61212270	Clear Creek	5	20.6	73
61225160	Dry Fork	5	20.6	95
61214210	Jones Creek	5	14.4	71
61225110	L.N. Fork Spring R.	5	21.9	100
61225260	Pettis Creek	5	14.5	39
61224100	Williams Creek	5	14.1	55