GEOLOGY

PHYSIOGRAPHIC REGION

The basin lies mostly within the Ozark Plateau with portions in the Springfield and Salem plateaus.

GEOLOGY

The basin is dominated by limestone, shale, and sandstone. The basin's floor consists of Jefferson City-Cotter dolomite followed in an upward direction by Compton limestone, Northview shale with siltstone, Pierson limestone, Elsey limestone, and the Burlington-Keokuk limestone formation. The top layer consists of Warsaw limestone (MDNR 1995a). The Northview shale acts as an aquitard, allowing for the emergence of many springs and seeps in the basin (Table 1, Figures 2A-D).

SOIL TYPES

Six major soil complexes are found in the basin---Viraton-Wilderness, Eldon-Pembroke, Peridge-Wilderness-Goss-Pembroke, Nixa-Clarksville, Needleye-Viration-Wilderness, and Gasconade-Opequon-Clarksville (Allgood et al. 1979).

The Viraton-Wilderness complex, along with the Eldon-Pembroke and Peridge-Wilderness-Goss-Pembroke complexes, are part of the Ozark Border soils. The Ozark Border group of soils is characterized by narrow ridgetops and valleys. The native vegetation for this group of soils consists of forest with tall grasses in the open areas and glades. The Viraton-Wilderness complex is a moderately sloping complex of soils which is moderately to well drained. These soils have a fragipan and are typically found on uplands (Allgood et al. 1979).

The Eldon-Pembroke complex is comprised of deep, well drained soils. These are also upland soils with a gentle to steep slope (Allgood et al. 1979).

The Peridge-Wilderness-Goss-Pembroke complex is a deep, moderate to well drained soil complex found in upland areas. The slope of these soils can range from virtually flat to very steep (Allgood et al. 1979).

The last three complexes, Nixa-Clarksville, Needleye-Viraton-Wilderness, and Gasconade-Opequon-Clarksville, are part of the Ozark soils group. These soils are found on the narrow, limestone ridges and the steep side slopes of valleys. The vegetation of this group of soils consists of forest on the steep slopes with pastures or fields on the level upland areas. The Nixa-Clarksville complex is the first of this group of soils and is characterized by gentle to steep slopes with moderate drainage and fragipans located in upland areas (Allgood et al. 1979).

The Needleye-Viraton-Wilderness complex is characterized by moderately well drained soils with a fragipan. These soils have a level to steep slope (Allgood et al. 1979).

The Gasconade-Opequon-Clarksville complex is comprised of shallow and well drained soils. They have a gentle to steep slope and are found in upland areas (Allgood et al. 1979).

Table 1. Springs of the James River Basin.

SPRING NAME	NEAREST TOWN	COUNTY	T R S
Barnett Spring	Hurley	Stone	26N 23W 7
Bean Factory Spring	Madry	Barry	25N 26W 25
Bell Spring*	Marshfield	Webster	29N 18W 4
Big Spring	Crane	Stone	25N 24W 28
Blue Spring*	Nixa	Christian	28N 22W 32
Bright's Spring	Purdy	Barry	24N 27W 12
Brock Spring	Cassville	Barry	23N 27W 33
Brown Spring*	Hurley	Stone	26N 24W 12
Camp Cora*	Nixa	Greene	28N 21W 30
Campground	Wilson's Creek	Greene	28N 23W 26
Carney Spring	Crane	Barry	24N 25W 3
Cave Spring	Elsey	Stone	25N 23W 19
Cave Spring	Jenkins	Barry	24N 25W 17
Cave Spring	Strafford	Webster	29N 19W 11
Crystal Spring*	Cassville	Barry	23N 27W 21
Danforth 1*	Strafford	Greene	29N 20W 5
Danforth 2*	Strafford	Greene	29N 20W 5
Double Spring	Republic	Christian	27N 23W 2
Dug Spring	Clever	Christian	27N 23w 30
Elm Spring	Marionville	Lawrence	26N 25W 12
Galena Spring	Cassville	Barry	23N 26W 17
Gum Spring	Crane	Barry	25N 25W 36
Hayes Spring	Hurley	Stone	26N 23W 34
Hilton Spring	Purdy	Barry	24N 26W 6
Hunt Spring*	Springfield	Greene	28N 21W 24
Indian Spring*	Battlefield	Greene	28N 22W 29
Jones Spring*	Springfield	Greene	29N 21W 27

Jumbo Spring	Clever	Christian	27N 23W 35
Lane Spring	Hurley	Stone	26N 23W 33
Lanetown Spring	Hurley	Stone	26N 23W 19
Lee Spring	Cassville	Barry	23N 27W 33
McCormack Spring	Seymour	Webster	29N 18W 11
McElwain Spring	Seymour	Webster	29N 18W 1
McMurty Spring*	Cassville	Barry	22N 27W 6
Melton Spring	Ozark	Christian	27N 21W 27
Monroe Spring*	Springfield	Greene	29N 21W 27
Montague Spring*	Highlandville	Christian	26N 22W 27
Mountaindale*	Seymour	Webster	29N 17W 23
Mount Sinai*	Clever	Christian	27N 23W 24
Old Still House	Hurley	Stone	26N 23W 35
Ollie Lasley*	Rogersville	Christian	28N 19W 31
Otto Lasley	Rogersville	Christian	27N 19W 7
Patterson Spring	Sparta	Christian	27N 19W 17
Pruitt Spring*	Republic	Greene	28N 23W 27
Rader Spring*	Springfield	Greene	28N 22W 18
Reed's Spring*	Reeds Spring	Stone	24N 23W 25
Rickman Spring	Hurley	Stone	26N 24W 24

Source: Vineyard (1982) and USGS 1:100,000 series topographic maps.

***More information on these springs, including rate of flow and temperature, can be found in Vineyard (1982).**

Note: T,R,S is a geographical reference referring to township(T), range(R), and section(S).

Table 1 continued.

SPRING NAME	NEAREST TOWN	COUNTY	T R S
Roaring Spring	Madry	Barry	25N 26W 26
Roundtree*	Springfield	Greene	28N 22W 8
Rumfelt Spring*	Seymour	Webster	29N 17W 23
Sequiota Spring*	Springfield	Greene	28N 21W 9
Sherrod Spring*	Springfield	Greene	29N 22W 33
Siloam Spring	Shell Knob	Barry	23N 25W 26
Spout Spring*	Cassville	Barry	23N 27W 1
Spout Spring	Nixa	Christian	27N 21W 18
Steele Spring	Hurley	Stone	26N 24W 13
Stutzman Spring*	Springfield	Greene	28N 22W 25
Tawsemtha*	Springfield	Greene	29N 21W 13
Terrapin Spring	Hurley	Stone	26N 24W 36
Todd Spring*	Fordland	Christian	28N 18W 33
Twin Spring	Butterfield	Barry	23N 27W 4
Upshaw Spring	Madry	Barry	25N 25W 20
Walnut Spring	Cassville	Barry	23N 27W 28
Ward Spring*	Springfield	Greene	28N 22W 14
Wasson Spring*	Nixa	Christian	27N 22W 25
Welch Spring*	Springfield	Greene	28N 22W 14
Winoka Spring*	Galloway	Greene	28N 21W 22
Wise Spring	Crane	Barry	25N 25W 4
Worley	Jenkins	Barry	24N 26W 27
Young Spring*	Nixa	Christian	27N 22W 20
Unnamed	Cassville	Barry	22N 27W 4
Unnamed	Cassville	Barry	23N 27W 30
Unnamed	Cassville	Barry	23N 27W 20

Unnamed	Cassville	Barry	23N 27W 21
Unnamed	Cassville	Barry	23N 27W 21
Unnamed	Cassville	Barry	23N 27W 3
Unnamed	Cassville	Barry	23N 27W 10
Unnamed	Cassville	Barry	23N 27W 12
Unnamed	Cassville	Barry	24N 27W 34
Unnamed	Cassville	Barry	23N 27W 36
Unnamed	Cassville	Barry	23N 26W 9
Unnamed	Cassville	Barry	23N 26W 10
Unnamed	Cassville	Barry	23N 26W 17
Unnamed	Crane	Barry	25N 25W 12
Unnamed	Jenkins	Barry	24N 26W 22
Unnamed	Jenkins	Barry	24N 26W 27
Unnamed	Jenkins	Barry	24N 26W 26
Unnamed	Jenkins	Barry	24N 25W 27
Unnamed	Leann	Barry	24N 26W 1
Unnamed	Leann	Barry	24N 26W 10
Unnamed	Leann	Barry	24N 26W 8
Unnamed	Leann	Barry	24N 26W 12
Unnamed	Lohmer	Barry	23N 26W 26

Source: Vineyard (1982) and USGS 1:100,000 series topographic maps.

***More information on these springs, including rate of flow and temperature, can be found in Vineyard (1982).**

Note: T,R,S is a geographical reference referring to township(T), range(R), and section(S).

Table 1 continued.

SPRING NAME	NEAREST TOWN	COUNTY	T R S
Unnamed	Lohmer	Barry	23N 26W 27
Unnamed	Lohmer	Barry	23N 26W 28
Unnamed	Lohmer	Barry	23N 26W 29
Unnamed	Madry	Barry	25N 25W 20
Unnamed	Madry	Barry	25N 25W 17
Unnamed	McDowell	Barry	24N 27W 12
Unnamed	McDowell	Barry	25N 26W 27
Unnamed	McDowell	Barry	25N 26W 27
Unnamed	Purdy	Barry	24N 27W 9
Unnamed	Purdy	Barry	25N 26W 16
Unnamed	Purdy	Barry	25N 26W 17
Unnamed	Star City	Barry	24N 26W 30
Unnamed	Star City	Barry	24N 26W 31
Unnamed	Star City	Barry	24N 27W 23
Unnamed	Wheelerville	Barry	24N 25W 3
Unnamed	Wheelerville	Barry	24N 25W 14
Unnamed	Wheelerville	Barry	24N 25W 15
Unnamed	Battlefield	Christian	27N 23W 1
Unnamed	Billings	Christian	27N 24W 36
Unnamed	Highlandville	Christian	26N 22W 15
Unnamed	Highlandville	Christian	26N 22W 16
Unnamed	Montague	Christian	26N 22W 27
Unnamed	Sparta	Christian	27N 19W 6
Unnamed	Sparta	Christian	27N 19W 12
Unnamed	Sparta	Christian	27N 19W 14
Unnamed	Sparta	Christian	27N 18W 21

Unnamed	Sparta	Christian	27N 19W 7
Unnamed	Sparta	Christian	27N 19W 11
Unnamed	Seymour	Douglas	27N 18W 20
Unnamed	Fordland	Greene	28N 19W 13
Unnamed*	Springfield	Greene	29N 20W 14
Unnamed	Springfield	Greene	29N 20W 33
Unnamed	Marionville	Lawrence	26N 25W 12
Unnamed	Clever	Stone	27N 24W 26
Unnamed	Clever	Stone	27N 23W 33
Unnamed	Crane	Stone	25N 24W 1
Unnamed	Crane	Stone	25N 24W 2
Unnamed	Crane	Stone	25N 24W 2
Unnamed	Crane	Stone	25N 24W 12
Unnamed	Crane	Stone	25N 24W 12
Unnamed	Crane	Stone	25N 24W 8
Unnamed	Crane	Stone	25N 24W 8
Unnamed	Crane	Stone	25N 24W 16
Unnamed	Crane	Stone	25N 24W 17
Unnamed	Crane	Stone	25N 24W 19
Unnamed	Elsey	Stone	25N 23W 18

Source: Vineyard (1982) and USGS 1:100,000 series topographic maps.

***More information on these springs, including rate of flow and temperature, can be found in Vineyard (1982).**

Note: T,R,S is a geographical reference referring to township(T), range(R), and section(S).

Table 1 continued.

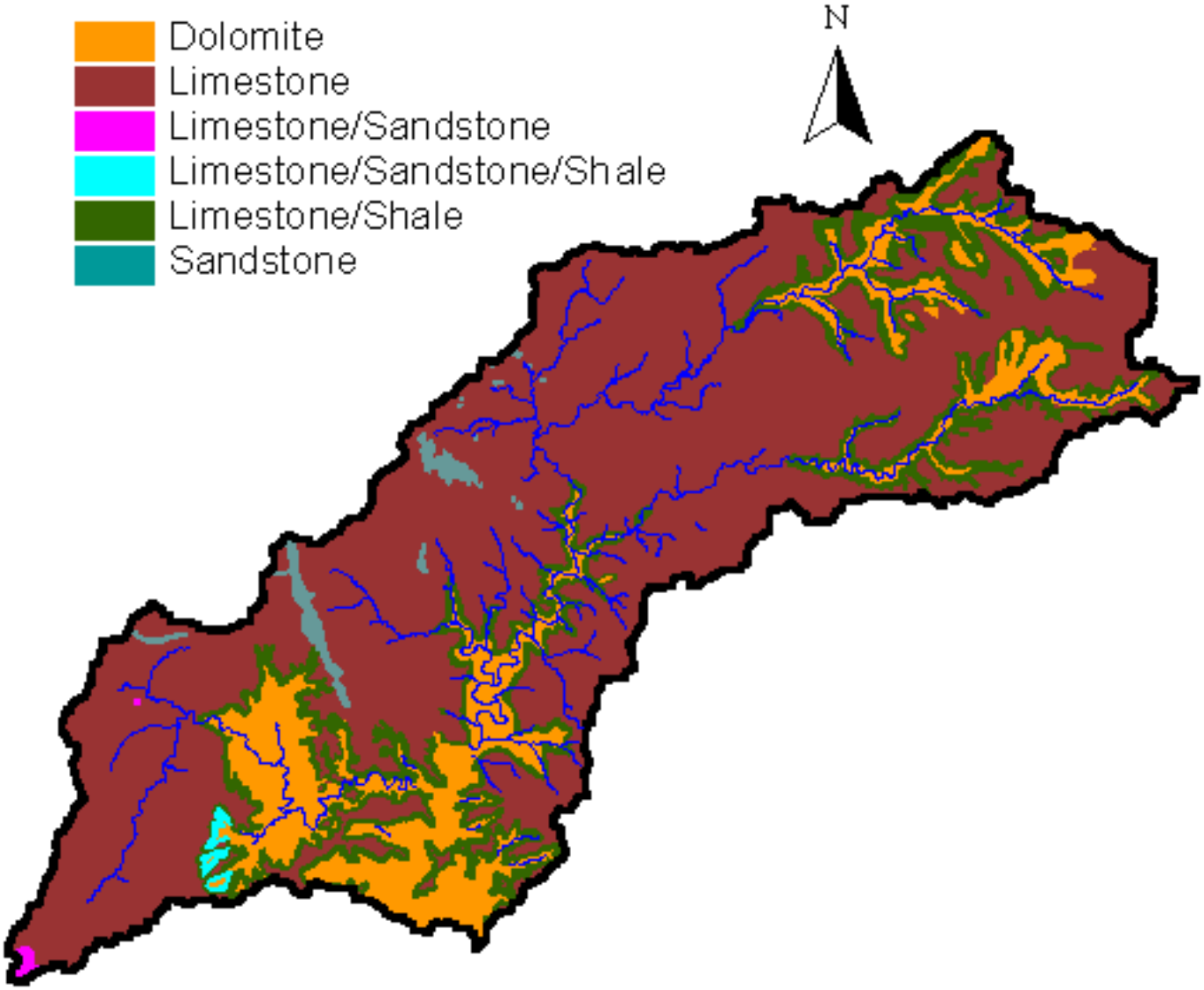
SPRING NAME	NEAREST TOWN	COUNTY	T R S
Unnamed	Elsey	Stone	24N 24W 5
Unnamed	Galena	Stone	25N 23W 29
Unnamed	Galena	Stone	25N 24W 25
Unnamed	Galena	Stone	25N 24W 28
Unnamed	Galena	Stone	25N 24W 33
Unnamed	Galena	Stone	25N 23W 31
Unnamed	Galena	Stone	24N 24W 3
Unnamed	Galena	Stone	24N 24W 17
Unnamed	Galena	Stone	24N 24W 20
Unnamed	Galena	Stone	24N 24W 22
Unnamed	Hurley	Stone	26N 24W 12
Unnamed	Hurley	Stone	26N 24W 12
Unnamed	Hurley	Stone	26N 24W 24
Unnamed	Hurley	Stone	26N 24W 23
Unnamed	White City	Stone	25N 22W 18
Unnamed	Fordland	Webster	29N 18W 9
Unnamed	Fordland	Webster	29N 18W 34
Unnamed	Fordland	Webster	28N 18W 20
Unnamed	Fordland	Webster	28N 18W 18
Unnamed	Seymour	Webster	28N 16W 19
Unnamed	Seymour	Webster	28N 16W 20
Unnamed	Seymour	Webster	28N 17W 30
Unnamed	Seymour	Webster	28N 17W 22
Unnamed	Strafford	Webster	29N 19W 11

Source: Vineyard (1982) and USGS 1:100,000 series topographic maps.

***More information on these springs, including rate of flow and temperature, can be found in Vineyard (1982).**

Note: T,R,S is a geographical reference referring to township(T), range(R), and section(S).

Geology of the James River watershed.



Soil erosion ranges from 18 to 24 tons/acre/year for tilled land, 2.5 to 5 tons/acre/year for permanent pasture, and 0.25 to 0.5 tons/acre/year for non-grazed forest. Gully erosion is slight (0 to 100 tons/square mile). Approximately 1.1 to 2 tons/acre/year of sediments reach impoundments or streams in the area. Of this total 89% is due to sheet and rill erosion, 3% is attributed to streambank erosion, and 7% comes from erosion due to sediments in urban and built-up areas (Anderson 1980).

STREAM ORDER

The James River is a seventh order stream which originates in Webster County. The major streams of the basin (fourth order and above), with their lengths and orders, are listed in Table 2.

WATERSHED AREA

The James River watershed is 1,512 square miles. The basin has been divided into four major sub-basins (Upper James River, Lower James River, Finley Creek, and Flat Creek; Figures 3A-D). The watershed areas of the streams with orders of 5 or greater are listed in Table 3.

CHANNEL GRADIENT

Channel gradients were calculated from U.S. Geological Survey (USGS) 7.5 minute topographic maps. Gradient plots for third order streams and above are available from MDC's Southwest Regional office in springfield MO.

The average channel gradients for the James River are:

Headwaters to Highway 125----15.2 ft/mi;

Highway 125 to Highway 65----4.04 ft/mi;

Lake Springfield Dam to Highway 14----5.4 ft/mi; and

Highway 14 to Galena----4.3 ft/mi.

Table 2. Major streams in the James River Basin.

STREAM NAME	ORDER (MAXIMUM)	LENGTH OF MAX ORDER (mi)
Flat Creek	6	59.53
Crane Creek	5	25.00
Finley Creek	5	52.84
Rockhouse Creek	5	10.30
Wilson Creek	5	15.57
Bearden Hollow	4	3.39
Dry Crane Creek	4	13.18
Dry Creek	4	10.05
Dry Creek	4	7.14
Elk Valley	4	7.55
Fortune Branch	4	4.15
Goff Creek	4	7.46
Green Valley Creek	4	6.36
Hilton Hollow	4	4.14
Hog Creek	4	5.86
Jenkins Creek	4	7.54
Little Crane Creek	4	8.45
Little Flat Creek	4	11.06
McCullah Hollow	4	7.48
N. Carolina Creek	4	4.80
Panther Creek	4	11.89
Parched Corn Hollow	4	5.51
Pedelo Creek	4	10.00
Spring Creek	4	10.80
Terrell Creek	4	10.13
Tory Creek	4	5.46
Turnbo Creek	4	8.77

Table 3. Fifth order and larger streams in the James River Basin.

STREAM NAME	ORDER	WATERSHED AREA (mi^2)
James River	7	1,512
Flat Creek	6	314
Wilson Creek	5	84
Finley Creek	5	277
Crane Creek	5	160
Rockhouse Creek	5	32

Missouri Natural Divisions Map.