

GEOLOGY

Physiographic Regions

Missouri has been divided into six Natural Divisions based on natural features including: soils, geology, topography, and plant and animal distributions (Thom and Wilson 1980). These six divisions are further divided into regions. The Watershed is located entirely within the Ozark Natural Division and the vast majority lies within the Springfield Plateau region (Figure GE01).

Geology

The geology of the Watershed is dominated by Ordovician dolomites and Mississippian limestones (Figure GE02). Most of the water movement is through the surface stream network. Water that does reach the subsurface will likely resurface locally where a stream valley incises the confining rock layer (MDNR 1996). Eleven springs have been located in the Watershed (Table GE01) and Figure GE02). Karst topography is limited to the extreme headwater area in Greene and Webster counties and most (7) of the springs are located there.

The surface of the Watershed consists mainly of Jefferson City-Cotter dolomite, with some occurrences of early Mississippian limestones on upland areas. Movement of water from the surface to subsurface is minimal throughout most of the Watershed. This is due to the stony red clay residue overlying much of the Jefferson City-Cotter and the presence of thin shale units within the formation.

Soil Types (Allgood and Persinger 1979).

The primary soils (Figure GE03) in the area were formed in cherty limestone, dolomite, or sandstone and are well to moderately well drained. Soils with fragipans are common. Alluvial soils on the floodplains along major streams are deep and well drained.

Barco Series

Moderately deep, well drained, moderately permeable soils on uplands. Formed in acid limestone. Slopes in the 2 to 9 percent range. Solum and depth to soft sandstone bedrock usually 20 to 40 inches.

Barden Series

Deep, moderately well drained, slowly permeable soils on uplands. Formed in loess or silty material and shale residuum. Slopes from 1 to 5 percent. Solum ranges from 30 to 60 inches, with the depth to shale bedrock typically exceeding 60 inches.

Bardley Series

Moderately deep, well drained permeable soils on uplands. Formed in cherty sediments and dolomite and limestone residuum. Slopes from 3 to 35 percent. Solum and depth to bedrock range from 20 to 40 inches. Chert and flagstone fragments range from 15 to 70 percent in surface layers.

Bolivar Series

Moderately deep, well drained, moderately permeable soils on uplands. Formed in acid limestone residuum. Slopes range from 5 to 14 percent. Solum and depth to weathered sandstone bedrock range from 20 to 40 inches. Depth to hard bedrock greater than 60 inches. Chert makes up 20 to 70 percent in

Figure GE01. Location of the Pomme de Terre River watershed within the Upper Ozark and Springfield Plateau regions of Missouri Natural Divisions.

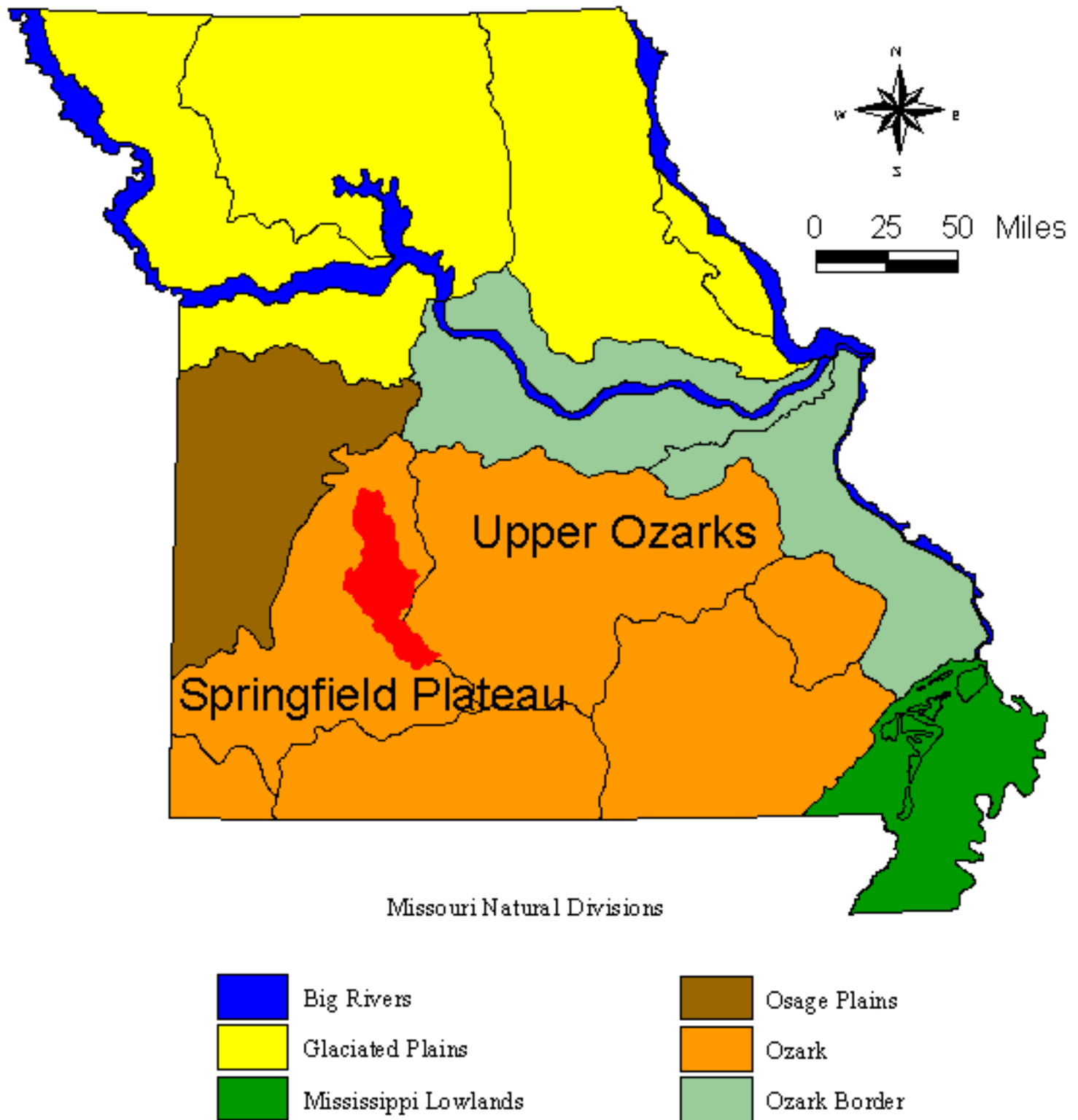


Figure GE02. Geology and springs of the Pomme de Terre River watershed.

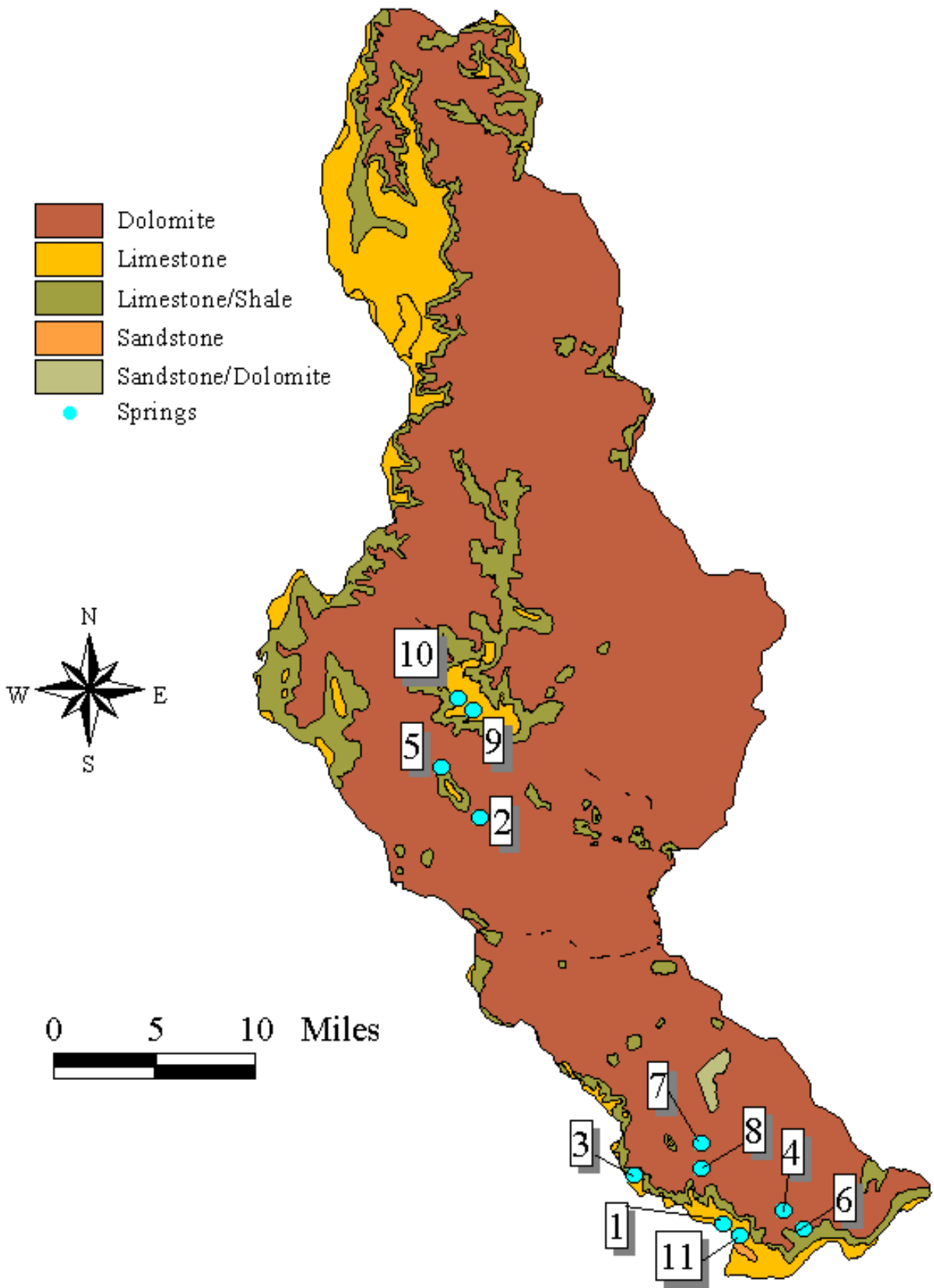


Figure GE03. Soils of the Pomme de Terre River watershed.

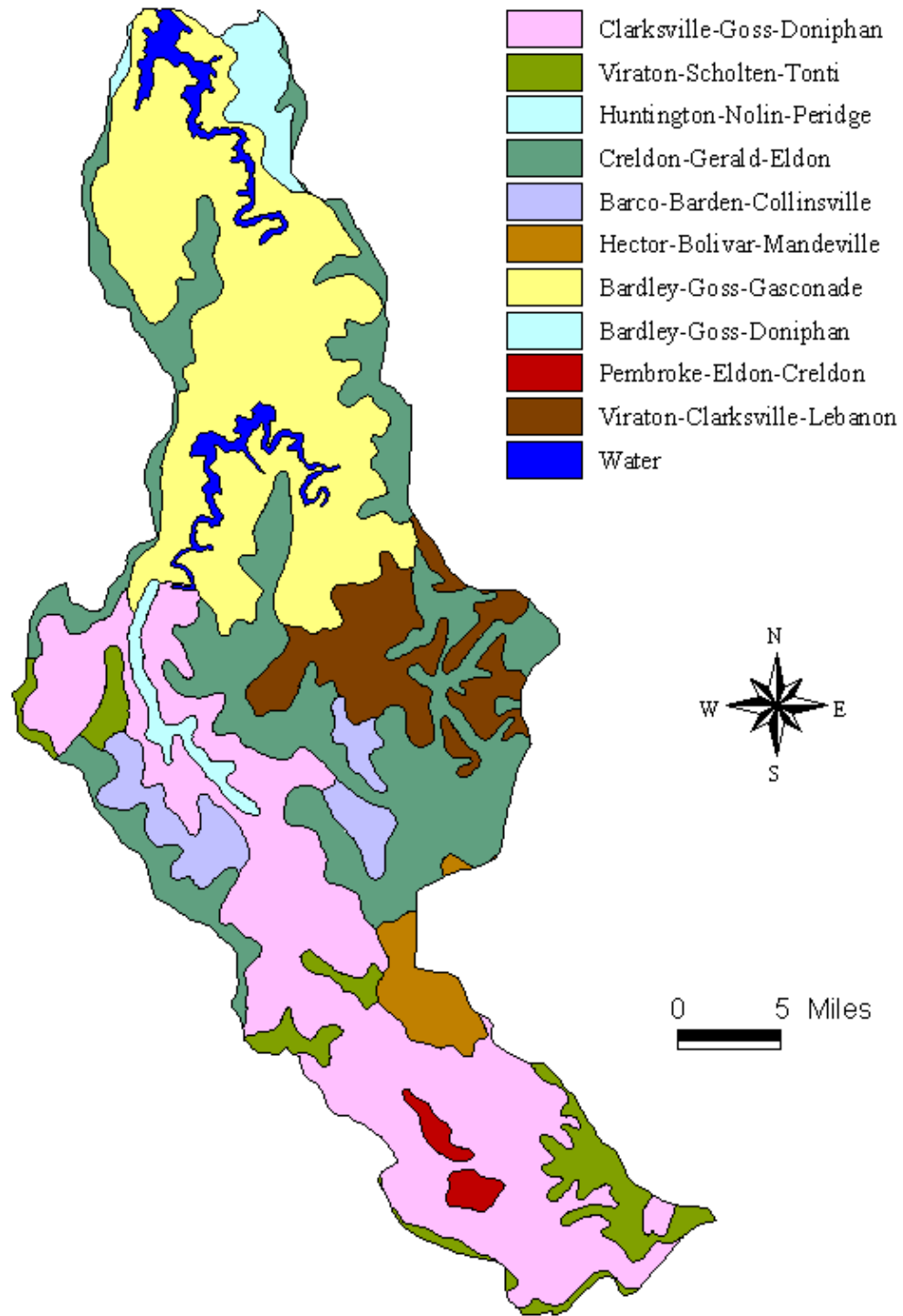


Table GE01. Springs in the Pomme de Terre River watershed (Vineyard and Feder 1989 and USGS 1:24,000 topographical maps).

Spring Number	Spring Name	County	Location	Topo Map	Discharge (cf/s)
1	Baumgartner	Greene	T30N, R20W, Sec.23	Strafford	0.05
2	Eidson	Polk	T33N, R22W, Sec.10	Cedar Vista	*
3	Elm	Greene	T30N, R21W, Sec.12	Bassville	0.02
4	Campbell	Webster	T30N, R19W, Sec.18	Strafford	1.29
5	Unnamed	Polk	T33N, R22W, Sec.08	Cedar Vista	0.01
6	Unnamed	Webster	T30N, R19W, Sec.20	Strafford	0.08
7	Unnamed	Greene	T31N, R20W, Sec.33	Bassville	*
8	Unnamed	Greene	T30N, R20W, Sec.04	Bassville	*
9	Unnamed	Polk	T34N, R22W, Sec.15	Polk	*
10	Unnamed	Polk	T34N, R22W, Sec.16	Polk	*
11	Unnamed	Greene	T30N, R20W, Sec.23	Strafford	*

***= data not available**

Table GE03. Third and higher order stream subwatersheds within the Pomme de Terre River watershed.

<u>Subwatershed Name</u>	<u>Max. Stream Order</u>	<u>Topographical Map(s)</u>
<u>Subwatersheds within the North Little Pomme de Terre River watershed</u>		
Little Pomme de Terre River (north)	fifth	Wheatland, Hermitage, Quincy, Fristoe, Warsaw West
Burbic Hollow	third	Quincy
Montgomery Hollow	fourth	Quincy, Wheatland, Hermitage, Fristoe
Trinity Hollow	third	Quincy, Fristoe
<u>Subwatersheds within the Pomme de Terre River watershed above Truman Lake level (706 ft.) and below Pomme de Terre Lake</u>		
Pomme de Terre River	sixth	Hermitage, Wheatland, Prestoe, Fristoe, Cross Timbers
Jordan Branch	fourth	Hermitage, Wheatland
Green Branch	fourth	Hermitage, Wheatland
Crane Creek	fourth	Hermitage, Preston, Urbana
Mill Creek	fifth	Hermitage, Preston
Rough Hollow	third	Hermitage
<u>Subwatersheds within the Pomme de Terre River watershed above Pomme de Terre Lake level (839 ft.)</u>		
Pomme de Terre River	fifth	
Dry Fork	fourth	Cliquot, Fair Play, Humansville, Elkton
Piper Creek	fourth	Cliquot, Polk, Bolivar, Cedar Vista
Unnamed #2	third	Cedar Vista
McKinney Branch	third	Cedar Vista
Sycamore Creek	fourth	Cedar Vista

Unnamed #3	third	Pleasant Hope
Little Pomme de Terre River (south)	third	Pleasant Hope, Bassville, Fair Grove, Strafford
South Fork	third	Strafford
North Fork	third	Strafford, Elkland, Marshfield
Mutton Hollow	third	Elkland
Unnamed #5	third	Elkland, Fairgrove
Unnamed #4	third	Elkland, Fairgrove
Little Wilson Creek	fourth	Fair Grove, Elkland, Half Way
Schultz Creek	fourth	Cedar Vista, Half Way
Deer Creek	third	Cedar Vista, Half Way
Wolf Creek	third	Cedar Vista, Half Way
Hominy Creek	third	Cedar Vista, Half Way, Buffalo NW, Polk
Unnamed #1	third	Polk
Davis Creek	third	Cliquot, Polk

Subwatersheds within the Lindley Creek watershed above Pomme de Terre Lake (839 ft.)

Lindley Creek	fifth	
Panther Creek	third	Polk, Buffalo NW
Brush Creek	third	Polk, Buffalo NW
Unnamed Third Order	third	Half Way, Charity
Little Lindley Creek	third	Buffalo NW, Buffalo
Unnamed Fourth Order	fourth	Buffalo NW, Buffalo, Tunas, Urbana
Jordan Creek	third	Buffalo NW, Urbana
Ingalls Creek		

the A horizon and 35 to 85 percent in Bt.

Clarksville Series

Deep, somewhat excessively drained, moderately rapid permeable soils on uplands. Formed in cherty limestone. Slope from 9 to 35 percent. Solum and depth to bedrock greater than 60 inches. Chert makes up 20 to 70 percent in the A horizon and 35 to 85 percent in Bt.

Collinsville Series

Moderately shallow, well drained, moderately rapid permeable soils on uplands. Formed under prairie grasses in sandstone residuum. Slopes from 5 to 14 percent. Solum and depth to sandstone bedrock less than 20 inches. Sandstone fragments present throughout the profile.

Creldon Series

Deep, moderately well drained soils on uplands with a fragipan. Above the fragipan, permeability is moderately slow. Formed in loess and loamy or clayey cherty limestone residuum. Slopes range from 2 to 9 percent. Solum and depth to bedrock are greater than 60 inches. Fragipan depth is in the 18 to 36 inch range. Chert fragments in the A horizon 0 to 5 percent, 0 to 10 percent in the Bt horizon, and from 0 to 60 percent in and below the 2Btx horizon.

Doniphan Series

Deep, well drained, moderately permeable soils on uplands. Formed in cherty sediments and in the underlying material weathered from clay shale and dolomite or cherty limestone. Slopes from 3 to 14 percent. Solum from 60 to more than 100 inches. Chert fragments range from 25 to 75 percent in the A horizon, and 0 to 15 percent in the 2Bt horizon.

Eldon Series

Deep, well drained, moderately permeable soils on uplands. Formed in cherty material weathered from limestone interbedded with shale and sandstone. Slopes in the 3 to 14 percent range. Solum is more than 60 inches thick. Coarse fragments up 8 to 40 percent of the A horizon, and from 8 to 15 percent in the Bt horizon.

Gasconade Series

Shallow, somewhat excessively drained, moderately slowly permeable soils on uplands. Formed in limestone residuum. Slopes from 2 to 50 percent. Solum and depth to limestone bedrock range from 4 to 20 inches.

Gerald Series

Deep, somewhat poorly drained soils, with a fragipan on uplands. Permeability is very slow in fragipan and moderately slow below. Formed in loess and underlying dolomite residuum. Slopes from 0 to 2 percent. Solum and depth to bedrock more than 60 inches. Depth to fragipan is 20 to 40 inches. Chert comprises less than 5 percent by volume above fragipan.

Goss Series

Deep, well drained, moderately permeable soils on uplands. Formed in cherty limestone residuum.

Slopes from 14 to 45 percent. Solum from 55 inches to 8 feet, with coarse fragments in the 10 to 80 percent range throughout the profile.

Hector Series

Moderately shallow, well drained, rapidly permeable soils on uplands. Formed under timber in sandstone residuum. Slopes from 5 to 14 percent. Solum and depth to sandstone bedrock less than 20 inches. Sandstone fragments present throughout the profile.

Huntington Series

Deep, well drained, moderate permeability on floodplains along major streams. Formed in silty alluvium. Slope from 0 to 2 percent. Solum and depth to nonconforming cherty layers between 40 to 60 inches. Coarse fragments comprise less than 5 percent throughout.

Lebanon Series

Deep, moderately well drained soils with a fragipan. Permeability above the fragipan is moderate, and slow at the fragipan. Formed in loess and dolomite residuum. Slopes from 2 to 5 percent. Solum and depth to bedrock 60 inches, with a fragipan at a depth of 18 to 36 inches.

Mandeville Series

Moderately deep, well drained, moderately permeable soils on uplands. Formed in acid shale residuum. Slopes from 2 to 5 percent. Solum and depth to soft shale bedrock range from 20 to 40 inches. Depth to hard bedrock is greater than 60 inches.

Nolin Series

Deep, well drained, moderately permeable soils on floodplains. Formed in alluvium. Slopes from 1 to 3 percent.

Pembroke series

Very deep, well drained, moderately permeable soils on uplands. Formed in loess. Slopes from 2 to 16 percent. Solum as deep as 60 inches.

Peridge Series

Deep, well drained, moderately permeable soils on uplands. Formed in loess and limestone residuum. Slope from 1 to 9 percent. Chert from 0 to 10 percent in upper 40 inches and 0 to 35 percent below 40 inches.

Scholten Series

Deep, moderately well drained soils, with a fragipan on uplands. Permeability very slow in the fragipan, moderate above, and moderate below. Formed in cherty limestone. Slope from 2 to 9 percent. Depth to fragipan is 18 to 27 inches. Chert comprises 15 to 40 percent in the A and E horizons, 35 to 65 percent in Bt, and 15 to 70 percent in 2Btx and 3Bt.

Tonti Series

Deep, moderately well drained soils, with a fragipan on uplands. Permeability is moderate above and slow within the fragipan. Formed in loess and underlying cherty limestone. Slope from 2 to 5 percent. Depth to the fragipan is 15 to 25 inches. Chert exists 10 to 25 percent above and 60 to 65 percent in the fragipan.

Viraton Series

Deep, moderately well drained soils, with a fragipan on uplands. Permeability is moderate above and very slow in the fragipan. Formed in loess and cherty dolomite. Slope from 2 to 9 percent. Depth to fragipan is 16 to 33 inches. Chert ranges from 0 to 35 percent above, 25 to 70 percent in, and 5 to 60 percent below the fragipan.

Stream Orders and Gradients

For this report, the following information on Watershed streams was limited to those that drain into the Pomme de Terre River upstream of the normal pool level of Harry S. Truman Lake. There is a total of 357.5 miles of third and higher order (Strahler 1957) stream segments in the Watershed including 188.0 miles of third order, 85.3 miles of fourth order, 62.9 miles of fifth order and 21.3 miles of sixth order (Table GE02). Average gradients of third order streams ranged from 15.5 (Ingalls Creek) to 104.7 (Unnamed #4) feet per mile (Table GE02). Third order streams in the northern portion of the Watershed have steeper average gradients than those in the rest of the Watershed (Figure GE04). Average gradients for fourth order streams range from 14.6 (Piper Creek) to 110.0 (Vanderman Branch; (Table GE02) feet per mile. The only sixth order stream segment in the Watershed, a 21.3 mile segment Pomme de Terre River stretching from Harry S. Truman Lake normal pool level upstream to Pomme de Terre Dam, has a gradient of 1.7 feet per mile. Third and higher order stream subwatersheds are listed in (Table GE03). Locations and gradient plots for all third and higher order streams were calculated using USGS 7.5 minute topographic maps (Figure GE05), and are available from the Missouri Department of Conservations (MDC) office in Clinton, MO.

Figure GE04. Average gradients for third and higher order streams in the Pomme de Terre River watershed plotted by hydrologic unit number and the median value for each hydrologic unit.

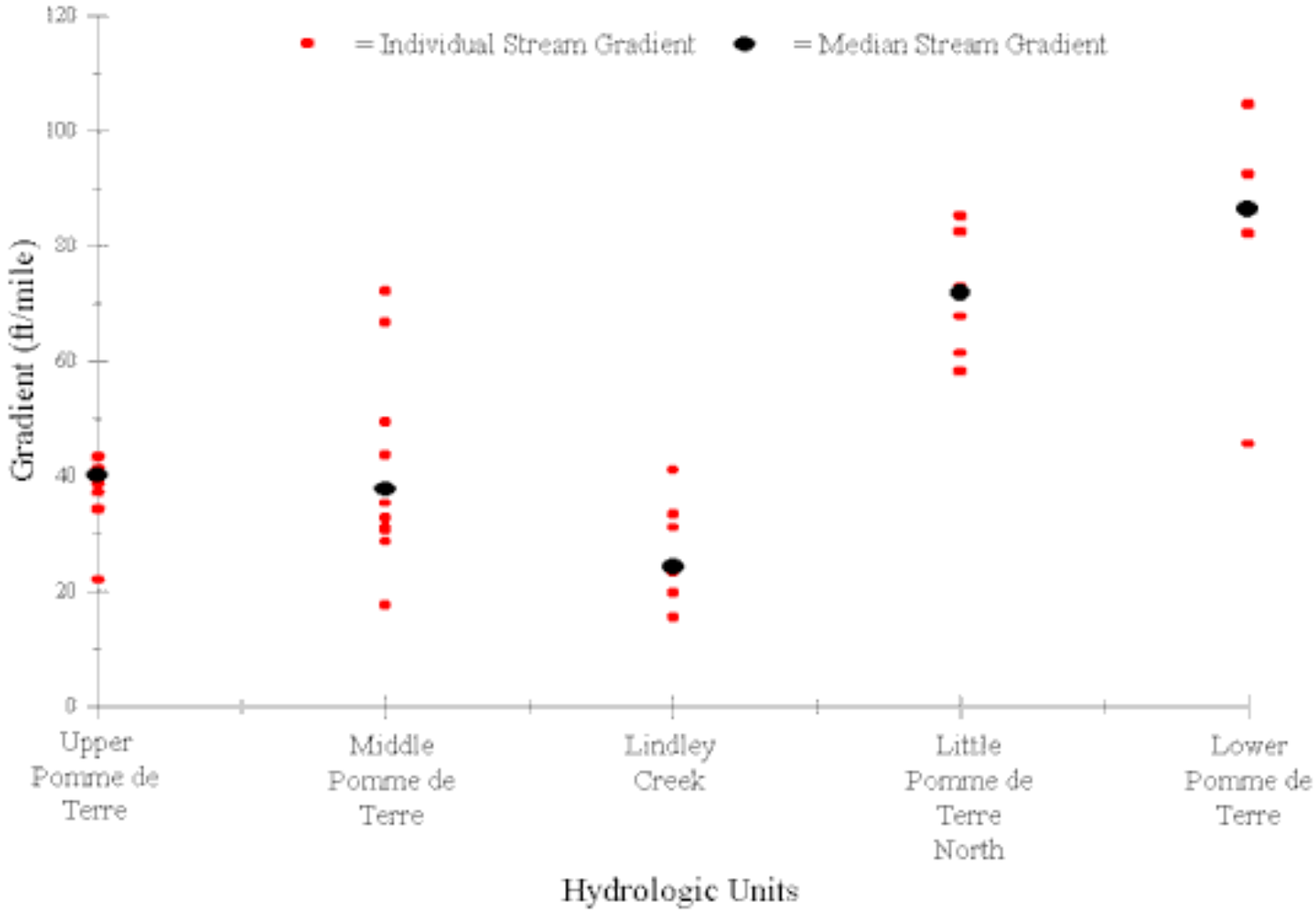


Figure GE05. USGS topographic map (1:24,000 scale) coverage for the Pomme de Terre River watershed.

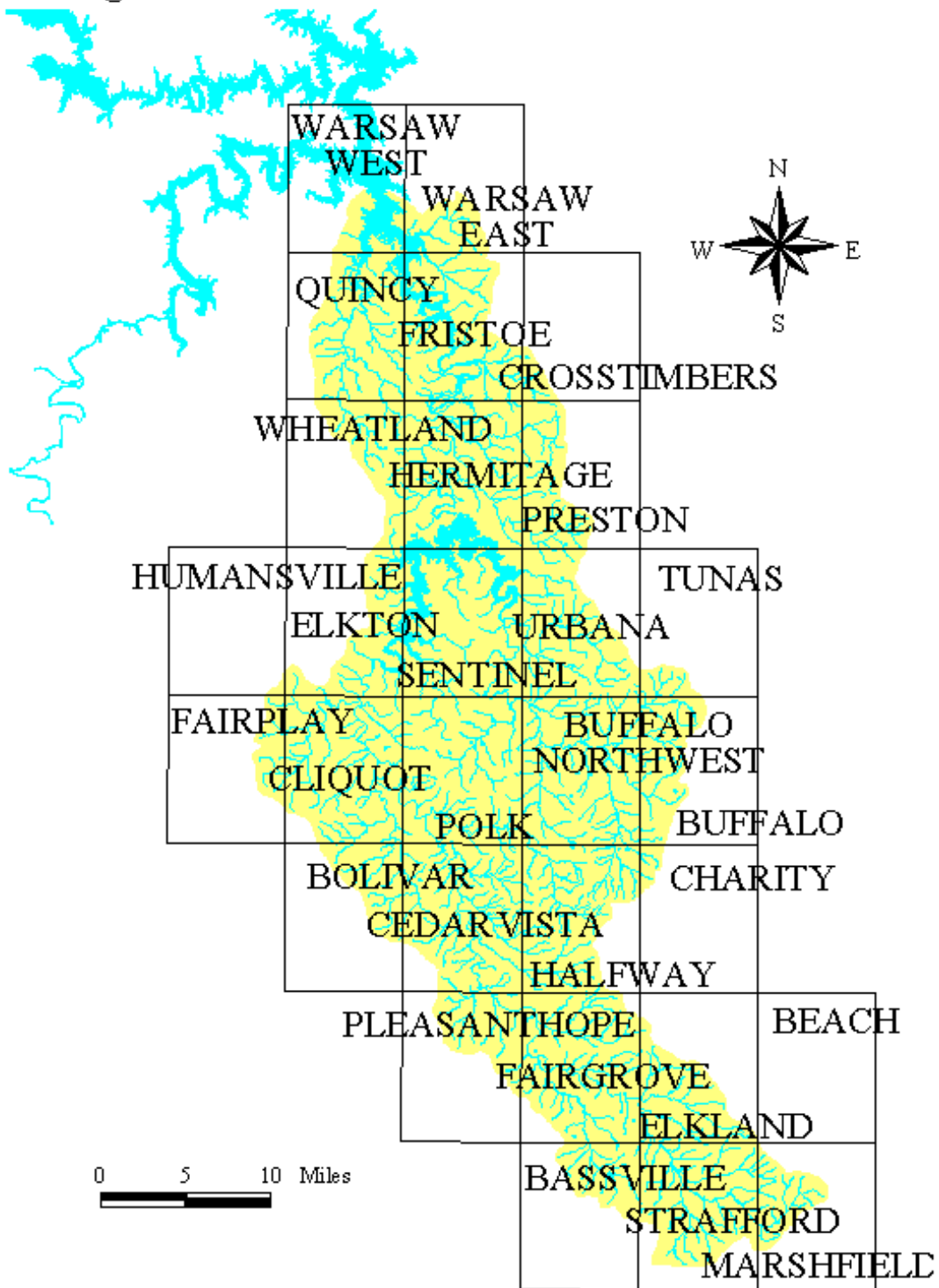


Table GE02. Attributes of third and higher order stream segments in the Pomme de Terre River watershed.

Stream Name	Hydrologic	Elevation		Avg.	Length (miles)				
	Unit	(msl)		Gradient	3 ⁰	4 ⁰	5 ⁰	6 ⁰	Tot.
	Number	Begin	End	(ft/mi)					
Ashlock Creek	10290107020	891	1145	43.8	2.5				5.8
Brush Creek	10290107030	915	1135	19.8	3.9				11.1
Cedar Hollow	10290107050	784	1017	86.3	0.4				2.7
Clark Branch	10290107050	768	984	74.5	1.6	0.6			2.9
Claude Branch	10290107050	880	1040	45.7	0.3				3.5
Crane Creek	10290107050	732	1080	27.2	5.6	5.2			12.8
-Unnamed #2	10290107050	778	968	86.4	1.0				2.2
-Unnamed #3	10290107050	820	968	82.2	0.7				1.8
Davis Creek	10290107020	847	1090	32.8	4.0				7.4
Deer Creek	10290107020	928	1215	28.7	5.4				10.0
Dry Fork	10290107020	845	1145	20.7	4.4	6.5			14.5
Flint Creek	10290107020	927	110	49.5	2.1				3.7
Green Branch	10290107050	738	1017	66.4	1.2	1.3			4.2
Hominy Creek	10290107020	895	1250	17.6	18.3				20.2
Ingalls Creek	10290107030	843	1115	15.5	13.2				17.6
Jordan Branch	10290107050	725	1050	50.0	2.6	3.1			6.5
Jordan Creek	10290107030	903	1100	33.4	1.7				5.9
Lindley Creek	10290107030	839	1220	11.5	0.4	8.0	21.5		33.2
-Unnamed #4	10290107030	1053	1190	31.1	1.3				4.4
-Unnamed #5	10290107030	947	1185	23.3	2.0	5.4			10.2
-Unnamed #6	10290107030	1027	1175	41.1	0.9				3.6

Little Lindley Cr.	10290107030	958	1190	23.2	5.4			10.0
Little PDT R. (N)	10290107040	738	1050	23.8	1.6	7.4	2.4	13.1
-Unnamed #7	10290107040	794	951	82.6	0.3			1.9
-Unnamed #8	10290107040	853	984	72.8	0.4			1.8
-Unnamed #9	10290107040	869	984	71.9	1.0			1.6
-Unnamed #10	10290107040	889	1017	85.3	0.6			1.5
-Unnamed #12	10290107040	912	1034	67.8	0.5			1.8
Little PDT R. (S)	10290107010	1020	1400	22.0	13.7			17.3
Little Wilson Cr.	10290107010	1003	1285	30.3	5.7	2.1		9.3
McKinney Branch	10290107020	935	1125	37.3	1.5			5.1
Mile Branch	10290107020	907	1168	38.4	3.5			6.8
Mill Creek	10290107050	722	1060	27.3	5.4	0.5	2.5	12.4
-Unnamed #15	10290107040	869	974	58.3	0.7			1.8
-Unnamed 316	10290107040	948	1034	61.4	0.5			1.4
Mutton Hollow	10290107010	1084	1418	34.4	6.4			9.7
North Fork	10290107010	1140	1430	37.2	4.1			7.8
Panther Creek	10290107030	892	1120	24.3	7.2			9.4
Piper Creek	10290107020	865	1120	14.6	3.8	8.3		17.5
-Unnamed #17	10290107020	958	1105	66.8	0.8			2.2
-Unnamed #18	10290107020	1005	1120	31.1	2.5			3.7
Prater Branch	10290107010	1040	1270	43.4	2.5			5.3
PDT River (*)		705	742	1.7				21.3
PDT River (**)		839	1460	7.9	11.2	20.2	36.5	78.8
Rough Hollow	10290107050	722	935	92.6	0.9			2.3

Schultz Creek	10290107020	955	1235	28.0	1.7	6.0	10.0
-Unnamed 24	10290107020	1065	1270	43.6	1.9		4.7
South Fork	10290107010	1135	1470	41.4	6.5		8.1
Stinking Creek	10290107050	840	1100	32.9	3.9	2.6	7.9
Sycamore Creek	10290107010	975	1130	35.2	1.1	0.7	4.4
-Unnamed #25	10290107010	985	1190	40.2	2.0		5.1
Town Branch	10290107020	937	1120	30.5	3.2		6.0
Unnamed #19	10290107020	879	1100	72.2	1.8		3.2
Unnamed #20	10290107020	915	1095	38.3	1.3		4.7
Unnamed #21	10290107010	980	1170	38.8	1.7		4.9
Unnamed #22	10290107010	1054	1275	40.2	1.1		5.5
Unnamed #23	10290107010	1084	1325	40.2	3.1		6.0
Vanderman Branch	10290107050	814	1001	110.0	0.4	0.6	1.7
Wolf Creek	10290107020	910	1165	35.4	3.6		7.2
TOTAL				188.0	85.3	62.9	21.3

***=Pomme de Terre River from Harry S. Truman Lake normal pool level to Pomme de Terre Dam.**

****=Pomme de Terre River from Pomme de Terre Lake normal pool to head of stream.**

Note: Beginning and ending elevations, average gradient, and total lengths were calculated from the mouth to the origin of each stream.