

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

**PHYSICAL CHARACTERISTICS OF STREAM SUBBASINS
IN THE BLUE EARTH RIVER BASIN, SOUTH-CENTRAL
MINNESOTA AND NORTH-CENTRAL IOWA**

By D.L. Lorenz and G.A. Payne

OPEN FILE REPORT 91-512

U.S. GEOLOGICAL SURVEY



St. Paul, Minnesota

1992

Prepared in cooperation with the
MINNESOTA DEPARTMENT OF TRANSPORTATION and the
U.S. ARMY CORPS OF ENGINEERS

PHYSICAL CHARACTERISTICS OF STREAM
SUBBASINS IN THE BLUE EARTH RIVER BASIN,
SOUTH-CENTRAL MINNESOTA AND NORTH-CENTRAL IOWA

By David L. Lorenz and Gregory A. Payne

ABSTRACT

This report presents data describing the physical characteristics of stream basins upstream from selected points on streams in the Blue Earth River basin, located in south-central Minnesota and north-central Iowa. The physical characteristics are the drainage area of the basin, the percentage area of the basin covered only by lakes, the percentage area of the basin covered by both lakes and wetlands, the main-channel length, and the main-channel slope. The points on the stream include outlets of subbasins of at least five square miles, outfalls of sewage treatment plants, and locations of U.S. Geological Survey gaging stations.

INTRODUCTION

The Blue Earth River basin is represented by hydrologic accounting units 07020009 (main channel of the Blue Earth River), 07020010 (Watonwan River), and 07020011 (Le Sueur River) (U.S. Geological Survey, 1974a and 1974b). Upstream from its mouth, the Blue Earth River drains a total area of 3,540 square miles. This report presents detailed data from hydrologic accounting unit 07020009, which includes parts of the counties of Blue Earth, Cottonwood, Faribault, Freeborn, Jackson, Martin, and Watonwan in south-central Minnesota and the counties of Emmet, Kossuth, and Winnebago in north-central Iowa.

This report is one of several that present basin characteristics of streams in Minnesota. This report presents selected data for points on streams at outlets of subbasins larger than about five square miles; at outfalls of sewage treatment plants; and at locations of U.S. Geological Survey low-flow, high-flow, and continuous-record gaging stations located in the Blue Earth River basin. Selected data have been published for the Le Sueur (Lorenz and Payne, 1991a) and Watonwan (Lorenz and Payne, 1991b) River basins. The data for the Blue Earth River downstream from the confluences of the Le Sueur and Watonwan Rivers are corrected to include their drainage.

Acknowledgments

The Minnesota State Planning Information Center provided assistance with much of the digitizing and programing needed to produce this report. The Center's assistance is gratefully acknowledged.

METHODS

U.S. Geological Survey 7-1/2 minute series topographic maps were used as source maps to obtain the data recorded in this report. Paper copies of the maps were used. Data recorded from paper copies were in error by no more than twice the horizontal accuracy of National Mapping Standards of 40 ft. Positional accuracy is not critical, but this level of detail for the analysis of area is necessary for the study. Several of the topographic maps were available in "advance final print" versions only. Data recorded from these maps were projected into an Albers Equal-Area projection for storage and analysis.

The subbasin boundaries were delineated on the basis of topographic features and human activities recorded on topographic maps. Human activities along basin divides such as the installation of storm sewers, the drainage of wetlands, and the diversions of streams may alter the drainage area of the stream. Therefore, data from field inspections and recent drainage-ditch maps were transferred to the topographic maps.

The subbasin boundaries (represented by line segments) and labels were recorded using a geographic information system (GIS). The GIS was used to define the subbasin polygons, recording the line segments that comprise each subbasin and identifying the subbasin with a label. The GIS automatically calculates the area of each subbasin.

The lake data were obtained from Minnesota State Planning Information Center. The outline of each water body was compared to 7-1/2 minute topographic maps. The lake data were overlaid onto the subbasin data to associate each lake with a subbasin. The total lake area for each subbasin was calculated by the GIS.

Marsh data were recorded using a computer aided drafting (CAD) system and transferred to the GIS. The marsh data were overlaid onto the subbasin data to associate each marsh area with a subbasin. The total marsh area for each subbasin was calculated by the GIS. The total of marsh area and lake area determines the storage area.

The stream-channel line segments were recorded using the CAD and transferred to the GIS. The stream channel is defined as a single trace from its confluence or mouth to the basin divide. The trace is continuous and passes through marshes, lakes, and the midline of wide rivers and braided streams. Line segments forming an individual stream channel were identified manually and entered into the GIS database.

Elevation data for the streams were recorded using the CAD system at the intersection of topographic contour lines and stream channels. The data were transferred to the GIS and each data point was associated with a stream-channel line segment. Two points on the stream channel, at 10 percent and at 85 percent of the stream-channel length from the basin outlet to the drainage divide, were located by the GIS. The elevations of these two points were interpolated from the data recorded in the GIS. Stream slope was calculated by dividing the differences in elevation between these points and the distance along the stream channel between these points.

PHYSICAL CHARACTERISTICS OF STREAM SUBBASINS

The basin characteristics determined for each of the subbasins shown on plate 1 are presented in table 1. The stream subbasins presented in table 1 at the end of the report are ordered from headwaters to mouth. The rank of the stream is shown by indentation and indicates the drainage pattern of the stream. The first-ranked river is the Blue Earth River. Tributary streams are indented two spaces per rank.

The data for drainage area, main-channel length, and main-channel slope are reported using three significant figures or rounded to the nearest hundredth of a unit. The data for lake area and for storage area are reported using two significant figures or to the nearest tenth of a percent.

The following is an explanation of terms used in table 1:

Map Number. The arbitrary number used to identify a subbasin. The number is based on the Minnesota Common Stream Number System. The first two digits are 31 for all basins and were omitted to clarify the map. The last five digits of the seven-digit number are used (leading zeros omitted).

Downstream Order Number. Distinct eight-digit number assigned to each gaging station to provide geographic location and identification. The number is assigned based on the downstream order for each minor basin. The first two digits (05) designate the major river basin (upper Mississippi). The last six digits designate the downstream order of the location.

Stream Name. The name of the stream shown on the map. A U.S. Geological Survey gaging station name includes the name of the stream on which the gaging station is located.

Outlet Location. The U.S. Public Lands Survey System is used to describe subbasin outlet location down to quarter-quarter section. The description includes quarter-quarter section, section, township, and range.

Drainage area. That area, measured on a horizontal plane, enclosed by a topographic divide, within which direct surface runoff from precipitation normally flows by gravity into a watercourse above a specific point. This may include closed basins and other areas that do not contribute directly to surface runoff.

Lake Area. The percentage of the drainage area covered by open water.

Storage Area. The percentage of a drainage area covered by open water and marshes as shown on 7-1/2 minute topographic maps. Marshes are not shown on plate 1.

Length. The total length of the main channel from the basin outlet to the drainage divide. The main channel is the watercourse that drains the greatest area.

Slope. The average slope of the watercourse between the points at 10 and at 85 percent of the distance along the main channel from the basin outlet to the drainage divide.

REFERENCES

- Lorenz, D.L. and Payne, G.A., 1991a, Selected data for stream subbasins in the the Le Sueur River basin, south-central Minnesota, U.S. Geological Survey Open File Report 91-62, 8 p.
- 1991b, Selected data for stream subbasins in the Watonwan River basin, south-central Minnesota, U.S. Geological Survey Open File Report 91-61, 7 p.
- U.S. Geological Survey, 1974a, Hydrologic Unit Map--1974 State of Minnesota: Scale 1:500,000, 1 plate.
- 1974b, Hydrologic Unit Map--1974 State of Iowa: Scale 1:500,000, 1 plate.

Table 1.--Basin characteristic data for the Blue Earth River drainage basin

[Outlet location is quarter-quarter section, section, township, range]

Map number	Downstream order no.	Stream name	Outlet location	By subbasin			Cumulative to mouth of basin					
				Drainage area (square miles)	Lake area (percent of subbasin area)	Storage area (percent of subbasin area)	Drainage area (square miles)	Lake area (percent of total area)	Storage area (percent of total area)	Main channel length (miles)	Main channel slope (foot per mile)	
10700		Drainage Ditch No. 80	NE¼NE¼ 2 98N 28W	25.0	0.0	0.0	25.0	0.0	0.0	0.0	9.08	2.96
10800		Union Slough Ditch	NW¼NW¼ 25 99N 28W	35.3	2.5	3.7	60.3	1.5	2.1	12.4	12.4	1.04
10600		Drainage Ditch No. 90	NW¼NW¼ 25 99N 28W	23.5	.0	.0	23.5	.0	.0	12.1	12.1	4.96
10501	5317700	Union Slough outlet near Lakota, Iowa	SW¼SE¼ 11 99N 28W	3.27	.0	.0	87.1	1.0	1.5	14.6	14.6	1.17
10500		Union Slough Ditch	NE¼SE¼ 9 100N 28W	17.6	.0	.0	105	.8	1.2	21.9	21.9	1.48
10100		Drainage Ditch No. 3	SW¼NW¼ 30 100N 28W	16.5	.0	.0	16.5	.0	.0	12.9	12.9	5.39
10200		West Branch Blue Earth River	SW¼NW¼ 30 100N 28W	16.2	.0	.0	16.2	.0	.0	11.1	11.1	5.29
11500		West Branch Blue Earth River	NE¼SE¼ 9 100N 28W	7.35	.0	.0	40.1	.0	.0	18.4	18.4	4.85
3802	5317810	West Branch Blue Earth River River at Minnesota-Iowa Border	SE¼SE¼ 35 101N 28W	4.00	.0	.3	149	.6	.9	23.0	23.0	1.53
10400		Ditch No. 60	SE¼NE¼ 10 100N 29W	10.2	.0	.0	10.2	.0	.0	8.88	8.88	6.82
10300		Ditch No. 60	NE¼NE¼ 10 100N 29W	10.2	.1	.1	20.5	.0	.0	9.15	9.15	6.67
3600		Judicial Ditch No. 7	SE¼SE¼ 28 101N 28W	11.9	.0	.6	32.4	.0	.3	13.6	13.6	5.04
3700		Tributary to Judicial Ditch No. 7	SE¼SE¼ 28 101N 28W	5.39	.0	.1	5.39	.0	.1	5.26	5.26	5.68
3500		Judicial Ditch No. 7	SE¼NE¼ 7 101N 27W	13.6	.0	.1	51.4	.0	.2	22.4	22.4	4.12
3801	53178102	West Branch Blue Earth River near Elmore	SW¼SE¼ 18 101N 27W	5.28	.1	.6	206	.4	.7	33.2	33.2	2.11
3800		West Branch Blue Earth River	NW¼NW¼ 8 101N 27W	.00	.0	.0	206	.4	.7	33.3	33.3	2.12
11400		Middle Branch Blue Earth River	SW¼NE¼ 10 99N 26W	17.5	.0	.0	17.5	.0	.0	10.7	10.7	8.01
11300		Tributary to Middle Branch Blue Earth River	SW¼NE¼ 10 99N 26W	7.83	.0	.2	7.83	.0	.2	5.71	5.71	9.96
11201		Buffalo Center sewage treatment plant outfall	SE¼NW¼ 8 99N 26W	5.71	.4	.4	31.0	.1	.1	13.2	13.2	6.68
11200		Middle Branch Blue Earth River	SE¼NW¼ 9 99N 27W	8.59	.0	.0	39.6	.1	.1	19.4	19.4	4.72
11100		Drainage Ditch No. 7	SE¼NW¼ 9 99N 27W	18.8	.0	.0	18.8	.0	.0	9.35	9.35	5.40

Table 1.--Basin characteristic data for the Blue Earth River drainage basin--Continued

Map number	Downstream order no.	Stream name	Outlet location	By subbasin			Cumulative to mouth of basin				
				Drainage area (square miles)	Lake area (percent of subbasin area)	Storage area (percent of subbasin area)	Drainage area (square miles)	Lake area (percent of total area)	Storage area (percent of total area)	Main channel length (miles)	Main channel slope (foot per mile)
11001	5317650	Middle Branch Blue Earth River near Lakota, Iowa	SE½SE¼ 31 100N 27W	5.00	0.0	0.0	63.4	0.0	0.1	22.9	4.23
11000		Middle Branch Blue Earth River Drainage Ditch No. 82	SW¼NE¼ 30 100N 27W	2.91	.0	.0	66.3	.0	.1	24.9	4.13
10900		Middle Branch Blue Earth River County Ditch No. 41	SE¼NW¼ 29 101N 27W	7.99	.0	.0	7.99	.0	.0	1.82	12.2
4000		Middle Branch Blue Earth River County Ditch No. 41	SE¼NW¼ 29 101N 27W	14.2	.0	.0	88.5	.0	.1	32.0	3.74
4100		Middle Branch Blue Earth River County Ditch No. 41	SE¼NW¼ 29 101N 27W	13.3	.3	.3	13.3	.3	.3	8.21	5.35
3900		Middle Branch Blue Earth River County Ditch No. 41	NW¼NW¼ 8 101N 27W	5.20	.0	.0	107	.1	.1	38.5	3.67
2102	5317818	Blue Earth River near Blue Earth Ditch to Judicial Ditch No. 13	SE¼SW¼ 5 101N 27W	.03	.0	.0	313	.3	.5	33.3	2.12
10000		Blue Earth River near Blue Earth Ditch to Judicial Ditch No. 13	NW¼SE¼ 12 101N 27W	20.7	.0	.0	20.7	.0	.0	16.2	7.17
4500		Judicial Ditch No. 13	SE¼NE¼ 10 101N 27W	30.6	.0	.1	51.3	.0	.0	21.7	5.76
4200		Judicial Ditch No. 80	SE¼NE¼ 10 101N 27W	40.9	.0	.0	40.9	.0	.0	16.4	6.03
4301	5317830	Coon Creek near Blue Earth	NW¼NE¼ 29 102N 27W	7.77	.2	.5	100	.0	.1	29.9	4.65
4300		Coon Creek	NW¼NW¼ 29 102N 27W	.16	.0	1.9	100	.0	.1	30.5	4.58
3400		Judicial Ditch No. 14	SW¼NW¼ 3 101N 28W	22.2	.0	.4	22.2	.0	.4	12.3	7.73
3300		Judicial Ditch No. 14	SW¼NW¼ 3 101N 28W	12.9	.0	.8	12.9	.0	.8	11.3	6.51
3100		Little Badger Creek	SE¼SE¼ 14 102N 28W	30.0	.0	.7	30.0	.0	.7	19.0	4.90
3201	5317840	Badger Creek near Blue Earth	SE¼NW¼ 13 102N 28W	12.9	.0	.0	77.9	.0	.5	20.1	6.33
3200		Badger Creek	SE¼NW¼ 18 102N 27W	1.25	.0	.0	79.2	.0	.5	22.2	6.12
2101		Blue Earth sewage treatment plant outfall	NE¼NE¼ 18 102N 27W	10.6	.2	.4	502	.2	.4	43.2	2.27
2100		Blue Earth River	NW¼SW¼ 8 102N 27W	.95	.0	.0	503	.2	.4	44.3	2.27
401	5317850	Foster Creek near Alden	NE¼NE¼ 9 102N 23W	2.34	.0	.0	2.34	.0	.0	3.23	26.3
400		Foster Creek	SE¼SE¼ 31 103N 23W	7.58	.8	1.1	9.92	.6	.8	6.44	16.7
500		Foster Creek	SE¼SE¼ 25 103N 24W	7.84	.0	.3	17.8	.3	.6	8.41	13.0
200		Judicial Ditch No. 14	SE¼SE¼ 25 103N 24W	10.8	.0	.1	10.8	.0	.1	6.14	10.0
300		Foster Creek	SW¼NE¼ 33 103N 24W	9.63	.0	.0	38.1	.2	.3	13.1	10.4
100		County Ditch No. 1	SW¼NE¼ 33 103N 24W	16.7	.0	.1	16.7	.0	.1	11.0	6.43
600		Tributary to Foster Creek	SW¼SW¼ 33 103N 24W	9.33	.0	.1	9.33	.0	.1	8.50	8.95

Table 1.--Basin characteristic data for the Blue Earth River drainage basin--Continued

Map number	Downstream order no.	Stream name	Outlet location	By subbasin			Cumulative to mouth of basin				
				Drainage area (square miles)	Lake area (percent of subbasin area)	Storage area (percent of subbasin area)	Drainage area (square miles)	Lake area (percent of total area)	Storage area (percent of total area)	Main channel length (miles)	Main channel slope (foot per mile)
1100		Foster Creek	NW¼SE¼ 1 102N 25W	5.46	0.6	3.0	69.6	0.1	0.4	16.9	8.10
900		East Branch Blue Earth River	SE¼SE¼ 31 102N 23W	7.16	.0	.4	7.16	.0	.4	4.18	28.3
800		Tributary to East Branch Blue Earth River	SE¼SE¼ 31 102N 23W	4.55	.0	.0	4.55	.0	.0	5.07	29.7
701	5317845	East Branch Blue Earth River near Walters	SE¼SE¼ 16 102N 24W	18.4	0.1	.1	30.2	.0	.2	10.4	12.9
700	5317980	East Branch Blue Earth River near Wells	SW¼SW¼ 1 102N 25W	14.5	15	23	114	1.9	3.3	18.0	7.44
1201	5318000	East Branch Blue Earth River near Bricelyn	NE¼NE¼ 23 102N 25W	5.29	17	32	120	2.6	4.6	21.0	5.81
1300		Tributary to East Branch Blue Earth River	SW¼NW¼ 25 102N 25W	7.73	.1	.1	7.73	.1	.1	5.79	34.2
1200		East Branch Blue Earth River	SW¼SE¼ 26 102N 25W	2.59	.1	.6	130	2.4	4.2	24.3	4.87
1001		Kiester sewage treatment plant outfall	NW¼NE¼ 28 101N 24W	14.5	.0	.3	14.5	.0	.3	6.97	11.5
1600		Tributary to Brush Creek	NW¼NE¼ 28 101N 24W	7.17	.2	2.8	7.17	.2	2.8	5.66	12.9
1000		Brush Creek	NE¼NW¼ 13 101N 25W	5.41	.3	.3	27.1	.1	1.0	11.5	9.73
1500		Tributary to Brush Creek	NE¼NW¼ 13 101N 25W	11.1	.0	.0	11.1	.0	.0	7.06	14.3
1402		Bricelyn sewage treatment plant outfall	NW¼SE¼ 2 101N 25W	7.70	.2	.2	45.9	.1	.6	13.7	9.46
1401	5318040	Brush Creek near Bricelyn	NW¼NE¼ 35 102N 25W	3.66	.0	.0	49.5	.1	.6	15.5	8.64
1400		Brush Creek	SW¼SE¼ 26 102N 25W	.16	.0	.0	49.7	.1	.6	16.0	8.48
4901	5318050	East Branch Blue Earth River near Bricelyn	NW¼NW¼ 4 101N 25W	5.70	.0	.1	185	1.7	3.1	30.6	3.89
4900		East Branch Blue Earth River	SE¼SW¼ 36 102N 26W	5.28	.0	.0	191	1.7	3.0	34.8	3.46
5000		County Ditch No. 44	SE¼SW¼ 36 102N 26W	11.1	.0	.0	11.1	.0	.0	9.44	8.53
4800		East Branch Blue Earth River	SE¼NE¼ 18 102N 26W	25.3	.0	.1	227	1.4	2.5	47.5	2.73
1700		County Ditch No. 25	NW¼SE¼ 2 102N 26W	9.96	.0	.1	9.96	.0	.1	6.45	6.23
1800		County Ditch No. 5	SE¼NE¼ 18 102N 26W	17.4	.0	.2	27.4	.0	.2	12.8	4.22
4701	5318100	East Branch Blue Earth River tributary near Blue Earth	SW¼SE¼ 24 102N 27W	9.66	.0	.0	9.66	.0	.0	6.46	9.09
4700		County Ditch No. 26	NE¼SW¼ 24 102N 27W	.16	.0	.0	9.83	.0	.0	6.93	8.93
4400		County Ditch No. 8	NE¼SW¼ 22 102N 27W	12.6	.0	.1	12.6	.0	.1	12.5	5.17
1900		County Ditch No. 14	NW¼NW¼ 22 102N 27W	13.0	.0	.2	13.0	.0	.2	7.20	11.8

Table 1.--Basin characteristic data for the Blue Earth River drainage basin--Continued

Map number	Downstream order no.	Stream name	Outlet location	By subbasin			Cumulative to mouth of basin					Main channel slope (foot per mile)
				Drainage area (square miles)	Lake area (percent of subbasin area)	Storage area (percent of subbasin area)	Drainage area (square miles)	Lake area (percent of total area)	Storage area (percent of total area)	Main channel length (miles)		
4601	5318120	East Branch Blue Earth River at Blue Earth	NW/4SW/4 8 102N 27W	6.76	0.3	1.5	296	1.1	2.0	60.3	2.58	
4600	3000	East Branch Blue Earth River County Ditch No. 60	NW/4SW/4 8 102N 27W SE/4NW/4 6 102N 27W	.01 3.51	.0 .0	.0 .0	296 3.51	.0 .0	.0 .0	60.4 5.99	2.58 12.2	
2201	5318123	Blue Earth River near Blue Earth County Ditch No. 17	NE/4NW/4 6 102N 27W NE/4SW/4 31 103N 27W	1.72 8.88	0.6 .0	0.8 .1	805 8.88	0.5 .0	1.0 .1	46.8 5.88	2.26 17.9	
2200	6500	Blue Earth River	SE/4NW/4 23 103N 28W	15.5	.1	.2	830	.5	1.0	54.8	2.16	
6400	6100	Iowa Lake Outlet Tributary to Swag Lake Judicial Ditch No. 38	SE/4SE/4 32 101N 30W SW/4NE/4 9 100N 30W NE/4NE/4 25 101N 30W	14.9 18.9 8.05	.12 .9 .0	12 1.7 .2	14.9 33.8 8.05	11.6 5.6 .0	11.9 6.2 .2	54.8 5.48 7.75	8.06 8.02 10.0	
6300	6200	South Creek	NE/4NE/4 25 101N 30W	12.5	2.7	4.0	54.3	4.1	4.8	14.2	6.20	
6000	5900	South Creek Judicial Ditch No. 98	NW/4NW/4 36 102N 30W NW/4NW/4 36 102N 30W	8.44 13.0	.14 .0	16 .1	62.7 13.0	5.4 .0	6.4 .1	21.2 7.30	4.21 7.39	
2903	2902	Rose Lake outlet South Creek near Imogene	NE/4NW/4 24 102N 30W NE/4NE/4 19 102N 29W	6.29 2.73	9.7 .7	11 3.6	82.0 84.7	4.9 4.7	5.7 5.6	23.8 27.0	3.81 3.50	
2901	2900	South Creek near Huntley South Creek near Winnebago	SW/4SE/4 19 103N 28W NE/4SW/4 22 103N 28W SE/4NW/4 23 103N 28W	21.0 5.80 .85	.1 .0 .0	2.5 .0 .0	106 111 112	3.8 3.6 3.6	5.0 4.8 4.7	41.1 47.8 49.7	3.16 3.25 3.35	
2300	6600	Blue Earth River	NE/4SE/4 10 103N 28W	7.19	.1	.1	949	.9	1.4	63.1	2.05	
7200	6701	Tributary to Hall Lake Dutch Creek George Lake outlet at Fairmont	NE/4NE/4 30 102N 30W NE/4SW/4 19 102N 30W NW/4SE/4 6 102N 30W	18.3 17.0 7.73	7.3 .1 21	7.5 .4 22	18.3 17.0 43.1	7.3 .1 6.9	7.5 .4 7.2	8.32 13.6 12.4	9.01 5.50 6.02	
6700	7700	Center Creek	NW/4NE/4 6 102N 30W	3.39	.0	.0	46.5	6.4	6.7	13.2	5.64	
7301	7300	Fox Lake outlet Welcome sewage treatment plant outfall	SW/4SW/4 34 103N 32W NE/4SE/4 36 103N 32W	6.87 7.52	.21 .0	22 .1	6.87 14.4	21.0 10.0	22.4 10.7	6.71 10.7	11.8 11.8	
7400	7101	Lily Creek County Ditch No. 52	SE/4SE/4 19 103N 31W SE/4SE/4 19 103N 31W	6.13 4.56	7.2 .0	11 .0	20.5 4.56	9.2 .0	10.8 .0	13.0 4.54	9.09 8.22	
5702	5701	Lily Creek near Fairmont	NW/4SW/4 31 103N 30W NW/4NE/4 6 102N 30W	14.8 .58	.0 .0	.4 1.0	39.9 40.4	4.7 4.7	5.7 5.6	21.4 22.9	4.84 4.76	
5701	5700	Center Creek at Fairmont Fairmont sewage treatment plant outfall	NW/4NW/4 5 102N 30W NE/4NW/4 5 102N 30W	4.16 .08	13 .0	15 .0	91.1 91.2	5.9 5.9	6.6 6.6	14.9 15.2	6.06 5.93	

Table 1.--Basin characteristic data for the Blue Earth River drainage basin--Continued

Map number	Downstream order no.	Stream name	Outlet location	By subbasin				Cumulative to mouth of basin				Main channel slope (foot per mile)
				Drainage area (square miles)	Lake area (percent of subbasin area)	Storage area (percent of subbasin area)	Drainage area (square miles)	Lake area (percent of total area)	Storage area (percent of total area)	Main channel length (miles)		
5700		Center Creek	NEANW 31 103N 29W	14.8	0.0	2.0	106	5.1	6.0	24.0	4.53	
5800		Judicial Ditch No. 70	NEANW 31 103N 29W	6.36	5.7	6.2	6.36	5.7	6.2	5.18	7.43	
2802	5318178	Center Creek near Granada	NEANW 26 103N 29W	5.51	.1	.8	118	4.9	5.7	31.1	3.85	
2801	5318180	Center Creek near Huntley	NEANW 17 103N 28W	15.9	0.0	1.4	134	4.3	5.2	38.1	3.36	
2800		Center Creek	NEANW 10 103N 28W	2.21	.0	.3	136	4.3	5.1	41.8	3.46	
2400		Blue Earth River	SWANW 4 103N 28W	4.51	.0	.3	1090	1.3	1.9	65.4	2.02	
9500		Tributary to Elm Creek	SEANW 25 104N 35W	5.70	5.2	6.3	5.70	5.2	6.3	6.59	11.8	
9700		Tributary to Elm Creek	SWANW 32 104N 34W	5.67	.0	.7	5.67	.0	.7	4.73	13.2	
9600		Elm Creek	SEANW 28 104N 34W	11.0	1.4	1.8	22.4	2.0	2.7	10.8	7.30	
9400		Judicial Ditch No. 33	SEANW 28 104N 34W	6.88	.0	.0	6.88	.0	.0	9.19	9.83	
9300		North Fork Elm Creek	NEANW 26 104N 34W	9.39	.4	.7	9.39	.4	.7	6.86	9.22	
8400		Elm Creek	NEANW 31 104N 33W	6.34	.4	.4	45.0	1.2	1.5	17.9	7.62	
9800		County Ditch No. 14	SEANW 19 103N 34W	10.0	.4	1.5	10.0	.4	1.5	5.04	12.9	
9900		South Fork Elm Creek	SEANW 19 103N 34W	6.33	.0	.0	6.33	.0	.0	6.42	11.6	
8500		South Fork Elm Creek	NEANW 31 104N 33W	13.6	.0	.0	29.9	.1	.5	18.1	7.56	
8300		Elm Creek	SEANW 5 103N 33W	3.46	.0	.0	78.4	.7	1.1	21.9	7.66	
8600		Tributary to Elm Creek	SEANW 5 103N 33W	8.51	4.8	4.9	8.51	4.8	4.9	5.84	15.2	
7601	5318200	Elm Creek near Trimont	SWANW 2 103N 32W	45.3	2.6	3.8	132	1.6	2.3	44.4	5.10	
7600		Elm Creek	NEANW 2 103N 32W	.86	.0	4.2	133	1.6	2.3	45.6	4.99	
7900		Cedar Creek	NWANW 8 104N 33W	9.87	.0	.2	9.87	.0	.2	7.55	12.7	
8000		Tributary to Cedar Creek	NWANW 8 104N 33W	4.50	.0	.0	4.50	.0	.0	5.09	18.7	
8100		Cedar Creek	SWANW 25 104N 33W	10.3	.0	.0	24.7	.0	.1	16.1	8.08	
8200		Tributary to Cedar Lake	SEANW 36 104N 33W	6.00	.0	.0	6.00	.0	.0	5.45	16.4	
7800		Cedar Lake outlet	NEANW 30 104N 32W	15.4	12	13	46.1	4.0	4.3	16.9	7.89	
7502		Trimont sewage treatment plant outfall	NWANW 32 104N 32W	2.72	.0	.0	48.9	3.7	4.1	19.1	7.26	
7501	5318220	Cedar Creek near Trimont	SEANW 34 104N 32W	4.06	.2	.2	52.9	3.5	3.8	22.6	6.50	
7500		Cedar Creek	NEANW 2 103N 32W	.70	.0	.0	53.6	3.4	3.7	25.4	5.72	
7002	5318224	Elm Creek near Trimont	NEANW 1 103N 32W	1.68	15	16	188	2.2	2.8	47.2	4.86	
7001	5318227	Elm Creek near Northrop	SEANW 1 103N 31W	18.8	.0	.0	207	2.0	2.5	59.6	4.21	
7000		Elm Creek	NEANW 32 104N 30W	3.31	2.7	3.1	210	2.1	2.6	62.5	4.22	
6800		County Ditch No. 72	SEANW 17 103N 30W	6.79	.5	1.3	6.79	.5	1.3	7.40	8.47	
6901	5318236	Martin Lake outlet near Northrop	NEANW 5 103N 30W	5.31	15	16	12.1	7.0	7.6	10.7	7.04	
6900		Martin Lake outlet	NEANW 32 104N 30W	.12	.0	5.2	12.2	6.9	7.5	11.2	6.67	

Table 1.--Basin characteristic data for the Blue Earth River drainage basin--Continued

Map number	Downstream order no.	Stream name	Outlet location	By subbasin			Cumulative to mouth of basin				
				Drainage area (square miles)	Lake area (percent of subbasin area)	Storage area (percent of subbasin area)	Drainage area (square miles)	Lake area (percent of total area)	Storage area (percent of total area)	Main channel length (miles)	Main channel slope (foot per mile)
5401	5318241	Elm Creek near Granada	SE½SW¼ 31 104N 29W	12.6	0.0	0.0	235	2.2	2.7	71.7	4.15
5400		Elm Creek	NE½SW¼ 5 103N 29W	1.57	.7	.7	237	2.2	2.7	74.3	4.10
5500		Judicial Ditch No. 8	NE½SW¼ 7 103N 29W	7.11	.2	.4	7.11	.2	.4	5.95	9.33
5600		Judicial Ditch No. 3	NE½SW¼ 5 103N 29W	15.5	.0	.4	22.6	.1	.4	9.80	6.90
5101	5318250	Elm Creek near Winnebago	NE½SE¼ 5 103N 28W	17.1	.2	.5	276	1.9	2.3	90.6	3.73
5100		Elm Creek	SW¼NE¼ 4 103N 28W	.57	.0	.0	277	1.9	2.3	92.1	3.71
2502	5318270	Blue Earth River at Winnebago	SW¼NE¼ 33 104N 28W	1.12	.0	.0	1370	1.4	2.0	68.0	1.99
2501		Winnebago sewage treatment plant outfall	NW¼NE¼ 33 104N 28W	.06	.0	.0	1370	1.4	2.0	68.2	1.99
2500		Blue Earth River	NE½SE¼ 6 105N 28W	30.8	.1	.7	1400	1.4	1.9	89.9	1.94
2600		County Ditch No. 89	NE¼NW¼ 24 105N 29W	14.7	.0	.1	14.7	.0	.1	10.4	6.48
2700		County Ditch No. 116	NE¼NW¼ 24 105N 29W	8.99	.0	.1	8.99	.0	.1	8.90	6.75
5200		Judicial Ditch No. 82	SE½SW¼ 13 105N 29W	21.7	.0	.0	21.7	.0	.0	12.7	8.85
5300		Judicial Ditch No. 85	SW¼NW¼ 13 105N 29W	15.9	.0	.2	15.9	.0	.2	14.4	8.20
8700		Tributary to Willow Creek	NE½SE¼ 1 105N 29W	13.6	.8	4.4	13.6	.8	4.4	9.19	8.51
8800		Willow Creek	NE½SE¼ 6 105N 28W	9.27	.8	1.2	84.1	.2	.9	19.5	5.59
8902	5318288	Blue Earth River at Vernon Center	NE½SE¼ 27 106N 28W	7.74	.0	.0	1490	1.3	1.9	99.0	1.96
8901		Vernon Center sewage treatment plant outfall	SE¼NW¼ 26 106N 28W	1.09	.0	.0	1490	1.3	1.9	102	1.97
8900		Blue Earth River	SE¼NE¼ 26 106N 28W	.15	.0	.0	1490	1.3	1.9	103	1.97
9000		Tributary to Blue Earth River	SE¼NE¼ 26 106N 28W	8.36	2.1	2.2	8.36	2.1	2.2	5.40	21.5
9100		Blue Earth River	NW¼SW¼ 18 107N 27W	28.3	.0	.3	1530	1.3	1.8	125	2.10
--		Watoman River		878	1.4	2.4					
9202	5320000	Blue Earth River near Rapidan	SE½SE¼ 6 107N 27W	2.84	2.7	2.8	2410	1.3	2.0	129	2.15
--		Le Sueur River	1110		2.2	4.2					
9201	5320833	Blue Earth River near Le Hillier	SE½SE¼ 14 108N 27W	16.5	1.2	2.7	3540	1.6	2.7	141	2.18
9200		Blue Earth River	NW¼NE¼ 14 108N 27W	.38	.0	.0	3540	1.6	2.7	141	2.17